PONY

سلسلة كتب الاستاذ



Computer and ICT



2025

1st Prep.



SECOND TERM

By: Eng. Osama Youssef

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سلسلة كتب الأستاذ

Computer and ICT

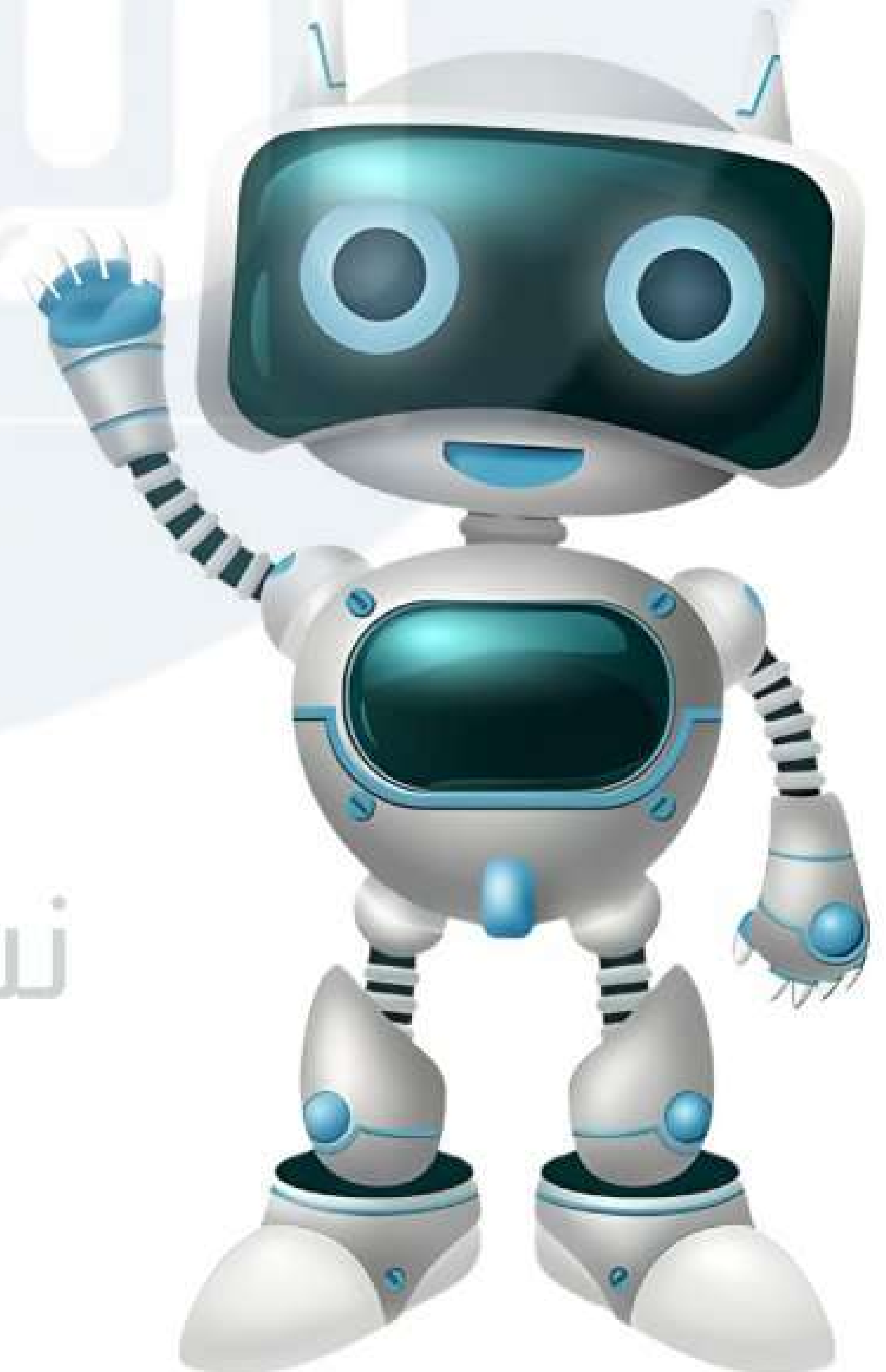
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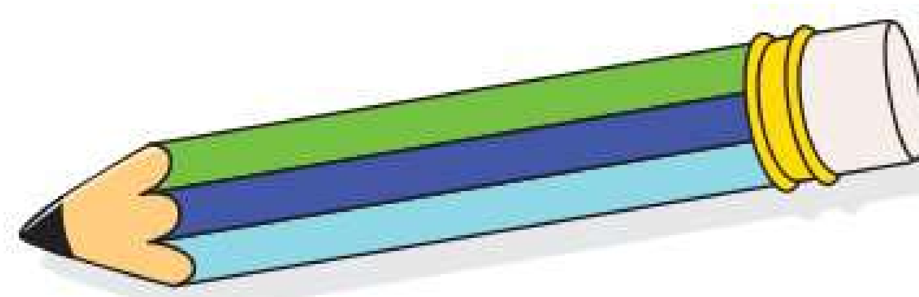
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Contents



Chapter Two Artificial Intelligence and Programming

Lesson 1

Artificial Intelligence Applications

Introduction to Artificial Intelligence

- In previous years, during the Primary Stage, you studied **the definition of artificial intelligence (AI)** and some of its **uses in our daily lives.**
- In this lesson, we will explore the **types of artificial intelligence** and its **applications** in our lives.

درست في السنوات السابقة بالمرحلة الابتدائية، **مفهوم الذكاء الاصطناعي وبعض استخداماته في حياتنا اليومية.**

في هذا الدرس، سنتعرف على **أنواع الذكاء الاصطناعي وتطبيقاته** في حياتنا.

Types of Artificial Intelligence

Artificial intelligence is not just one type. There are many and varied types, such as:

1. Narrow AI
2. General Artificial Intelligence (GAI)
3. Super Artificial Intelligence (SAI)

① Narrow AI

- It focuses on performing a specific task, such as recognizing faces or translating languages.

Example: A robot that can only play chess but cannot do anything else.

② General Artificial Intelligence (GAI)

- It is more advanced.
- It can perform any task that a human can do.

Example: A robot that completely mimics a human, as it can think, innovate, solve complex problems, learn, and adapt to different situations.

③ Super Artificial Intelligence (SAI)

- It is the most advanced.
- It can solve problems that are difficult for humans to solve easily.
- It can discover new things that we have never imagined before.

أنواع الذكاء الاصطناعي

الذكاء الاصطناعي ليس نوع واحد فقط، بل هناك أنواع عديدة ومتنوعة مثل:

1. **الذكاء الاصطناعي الضيق:** يركز على أداء مهمة محددة، مثل التعرف على الوجوه أو ترجمة اللغات.
   - مثال: روبوت يمكنه لعب الشطرنج بشكل رائع، لكن لا يمكنه فعل أي شيء آخر.
2. **الذكاء الاصطناعي العام (GAI):** وهو أكثر تقدمًا.
   - يستطيع أداء أي مهمة يمكن للإنسان القيام بها.
   - مثال: روبوت يحاكي الإنسان تمامًا، فهو يستطيع التفكير والإبداع وحل المشكلات المعقدة والتعلم والتكيف مع المواقف المختلفة.
3. **الذكاء الاصطناعي الفائق (SAI):** وهو الأكثر تقدمًا.
   - يمكنه حل المشكلات التي يصعب على البشر حلها بسهولة. كما يمكنه اكتشاف أشياء جديدة لم نتخيلها من قبل.

Applications of Artificial Intelligence in Daily Life
تطبيقات الذكاء الاصطناعي في الحياة اليومية

① Personal Assistant:

- It uses artificial intelligence to understand your commands and perform them.
- It is like a friend who talks to you, answers your questions, and performs tasks

Examples: Siri or Alexa



1. **المساعد الشخصي:** يستخدم الذكاء الاصطناعي لفهم أوامرك وتنفيذها.
   - يشبه صديق يتحدث معك ويجيب على أسئلتك وينفذ المهام.

2 Smart Games:



- Some video games use artificial intelligence to make the game more fun and challenging.
- **For example,** the characters in the game can learn from their mistakes and become smarter.

2 **الألعاب الذكية:** تستخدم بعض الألعاب الإلكترونية الذكاء الاصطناعي لجعل اللعبة أكثر متعة وتحديًا.

• على سبيل المثال، تستطيع الشخصيات داخل اللعبة أن تتعلم من أخطائها وتصبح أكثر ذكاءً.

3 Smart Cars:



- A car driving itself without a driver (self-driving car) is now becoming a reality because of artificial intelligence.

3 **السيارات الذكي:** السيارات التي تقود نفسها بدون سائق (السيارة ذاتية القيادة) أصبحت حقيقة واقعة بفضل الذكاء الاصطناعي.

4 Digital Doctors:



- Doctors use artificial intelligence to help them diagnose and treat diseases faster and more accurately.

4 **الأطباء الرقميون:** يستخدم الأطباء الذكاء الاصطناعي لمساعدتهم في تشخيص الأمراض وعلاجها بشكل أسرع وأكثر دقة.

5 Instant Translator:



- Artificial intelligence can translate words and sentences instantly, making it easier for people to communicate.

5 **المترجم الفوري:** يمكن للذكاء الاصطناعي ترجمة الكلمات والجمل بشكل فوري، مما يسهل التواصل بين الأشخاص.

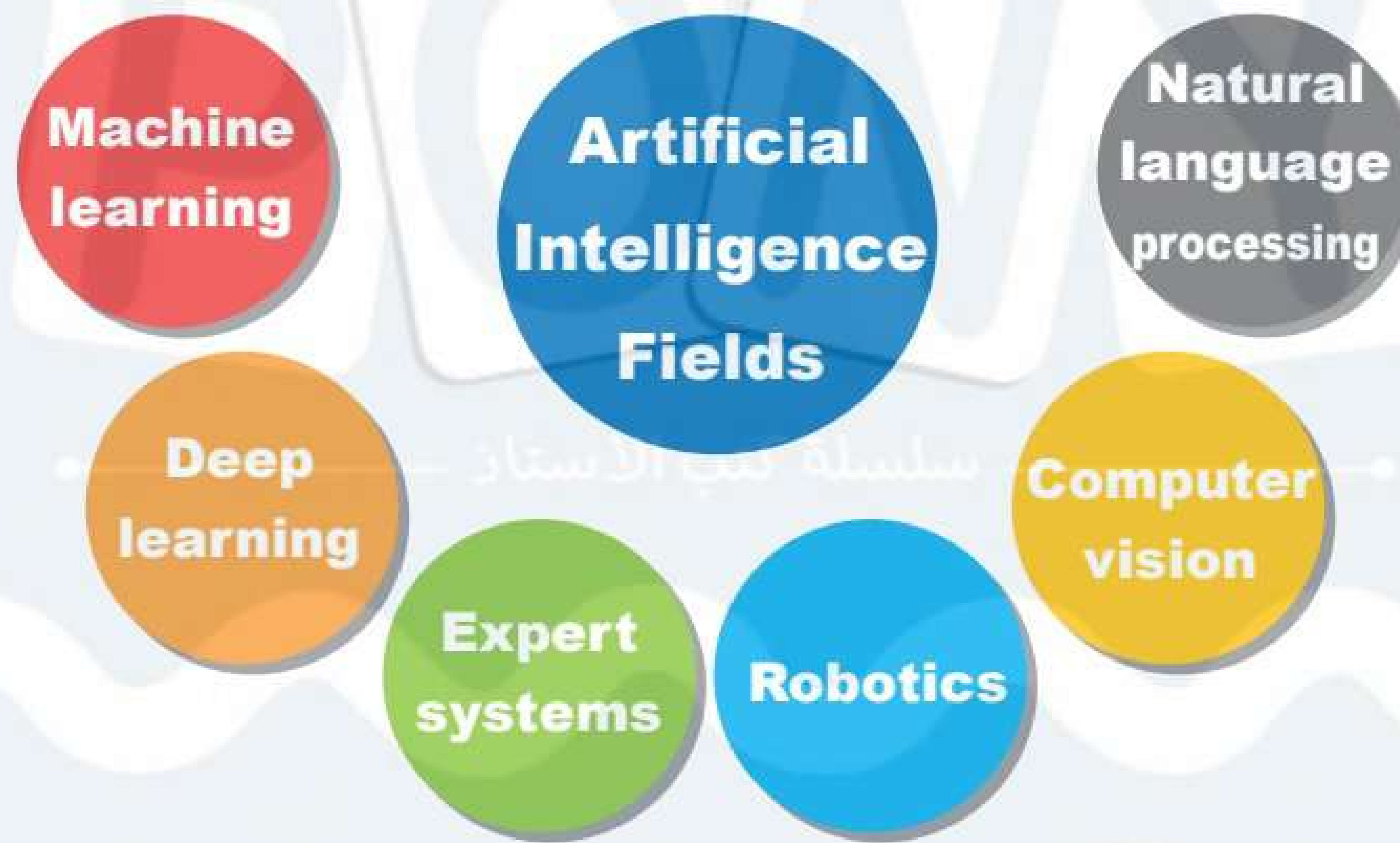
6 Smart Shopping:



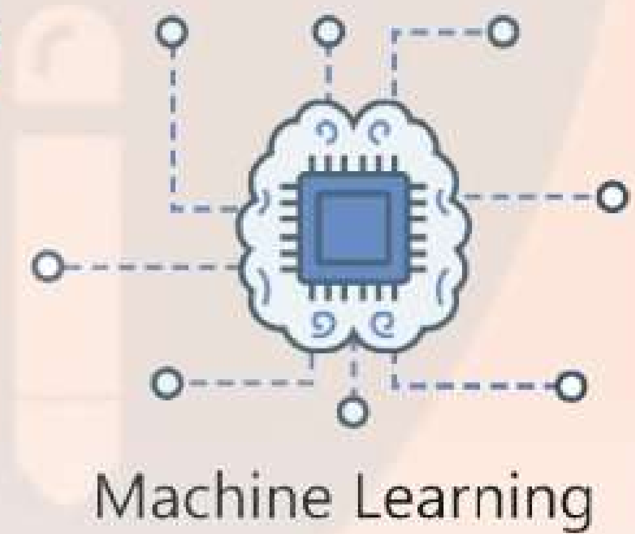
- Shopping sites often suggest products you might like, with the help of artificial intelligence that analyzes your previous purchasing behavior.

6 التسوق الذكي: مواقع التسوق غالبًا ما تقدم لك اقتراحات عن منتجات قد تعجبك، بفضل الذكاء الاصطناعي الذي يحلل سلوكك الشرائي السابق.

Artificial Intelligence Fields مجالات الذكاء الاصطناعي



1 Machine Learning – Learning from Mistakes

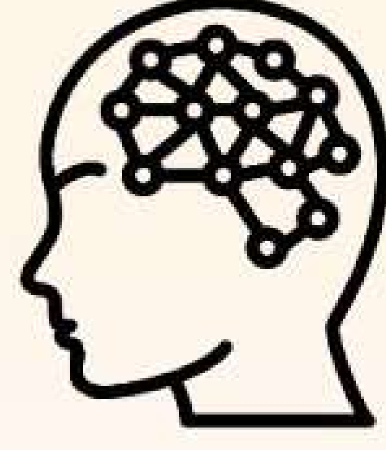

Machine Learning

- AI has to learn new things.
- The more we show it a picture of a cat, the more it learns to name it.
- The more we play a game with it, the smarter it becomes.
- Similar to when you learn to ride a bike, the more you fall, the better you learn how to balance.
- This is called **machine learning**.

1 التعلم الآلي – التعلم من الأخطاء

- يجب على الذكاء الاصطناعي أن يتعلم أشياء جديدة. كلما عرضنا عليه صورة قطة، كلما تعلم تسميتها، كلما لعبنا معه لعبة، أصبح أكثر ذكاءً.
- يشبه ذلك تعلم ركوب الدراجة، كلما سقطت أكثر، كلما تعلمت كيفية التوازن بشكل أفضل.
- هذا ما يسمى بالتعلم الآلي.

❷ Deep Learning – Simulation of Human Learning



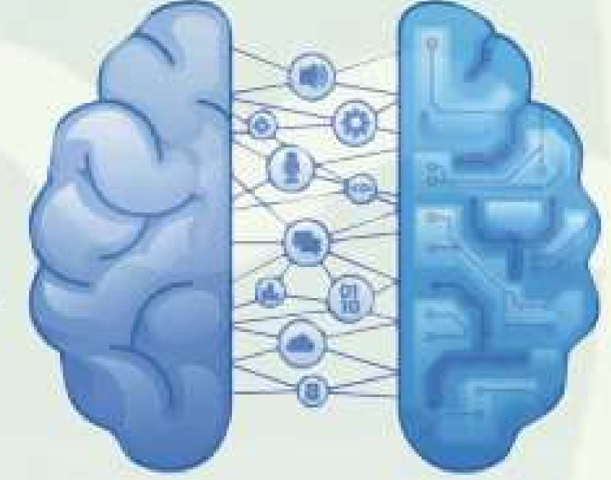
Neural Networks

- Deep learning aims to enable computer systems to learn complex tasks in a way similar to the way humans learn.
- Artificial intelligence has a mind similar to the human mind and uses this mind to learn things very quickly.
- Deep learning relies mainly on neural networks.

❷ التعلم العميق - محاكاة التعلم البشري

- يهدف التعلم العميق إلى تمكين أنظمة الكمبيوتر من تعلم المهام المعقدة بطريقة مشابهة للطريقة التي يتعلم بها الإنسان. فالذكاء الاصطناعي له عقلًا مشابهًا لعقل الإنسان ويستخدم هذا العقل لتعلم الأشياء بسرعة كبيرة.
- يعتمد التعلم العميق بشكل أساسي على الشبكات العصبية.

❸ Natural Language Processing (NLP) – Understanding Languages



- Can you imagine talking to your computer as if it were a friend?
- AI understands our different languages and can answer our questions.
- It is like an intelligent language translator; it understands written and spoken human language, interprets it, and learns to "speak" human language.
- This is called Natural Language Processing (NLP).

❸ معالجة اللغة الطبيعية (NLP) - فهم اللغات

- هل يمكنك أن تتخيل التحدث إلى جهاز الكمبيوتر الخاص بك كما لو كان صديقًا؟
- يفهم الذكاء الاصطناعي لغاتنا المختلفة ويمكنه الإجابة على أسئلتنا. إنه مثل مترجم لغة ذكي، فهو يفهم اللغة البشرية المكتوبة والمنطوقة، ويفسرها، ويتعلم "التحدث" بلغة الإنسان.
- هذا ما يسمى بمعالجة اللغة الطبيعية.

4 Computer Vision – Sees the World

- AI can look at a picture and tell you everything in it.
- It can find your face in a crowded picture
- It can distinguish between pictures of different animals.
- This is called **computer vision**.

4 الرؤية الكمبيوترية - يرى العالم

- يستطيع الذكاء الاصطناعي أن ينظر إلى صورة ويخبرك بكل ما فيها. يمكنه العثور على وجهك في صورة مزدحمة.
- كما يمكنه التمييز بين صور الحيوانات المختلفة. وهذا ما يسمى بالرؤية الكمبيوترية.

5 Robotics

- There are smart robots that can do many tasks, such as:
  1. Cleaning the house
  2. Playing chess
  3. Performing a complex and precise surgery
- They can work with great accuracy even in environments that are dangerous to humans.

5 الروبوتات

- هناك روبوتات ذكية تستطيع القيام بالعديد من المهام مثل:
  1 تنظيف المنزل
  2 لعب الشطرنج
  3 إجراء جراحة معقدة ودقيقة.
- الروبوتات لها القدرة على العمل بدقة كبيرة حتى في البيئات التي تشكل خطرًا على البشر.

6 Expert Systems – Simulation of Human Thinking and Decision-Making

- Artificial intelligence can solve complex problems and make difficult decisions.
- This is the field of expert systems.
- It is similar to an intelligent doctor who can diagnose diseases.

5 الأنظمة الخبيرة - محاكاة التفكير البشري واتخاذ القرار

- يمكن للذكاء الاصطناعي حل المشكلات المعقدة واتخاذ القرارات الصعبة.
- هذا هو مجال الأنظمة الخبيرة. إنه يشبه الطبيب الذكي الذي يمكنه تشخيص الأمراض.

Creating Intelligent Models Using Machine Learning

إنشاء نماذج ذكية باستخدام التعلم الآلي

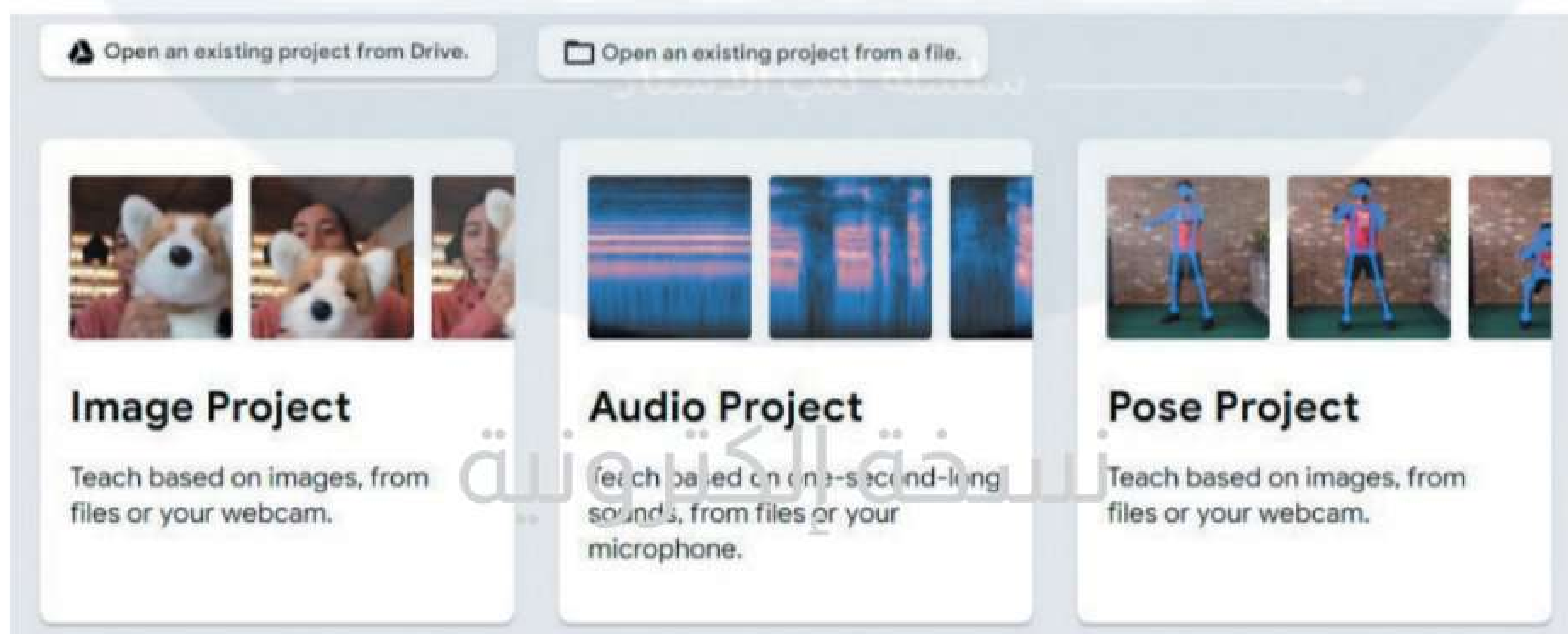
- You can create intelligent models to recognize images, sounds, and movements using machine learning (Teachable Machine).
- Imagine being able to teach a computer to recognize objects the same way you do.
- This is what **Teachable Machine** does.
- It's an easy-to-use tool.
- It helps create intelligent models to recognizes images, sounds, and movements.

- يمكنك إنشاء نماذج ذكية للتعرف على الصور والأصوات والحركات باستخدام التعلم الآلي (Teachable Machine).
- تخيل لو كان بإمكانك تعليم الكمبيوتر التعرف على الأشياء كما تتعلم أنت. هذا بالضبط ما يفعله موقع Teachable Machine.
- فهو أداة سهلة الاستخدام، تساعد في إنشاء نماذج ذكية للتعرف على الصور والأصوات والحركات.

NOTES:

- **To use "Teachable Machine" effectively:**
  1. Update your internet browser.
  2. Use the Microsoft Edge browser
  3. Click on the following link to go to the website: https://teachablemachine.withgoogle.com

- لاستخدام "Teachable Machine" بكفائة:
  1. قم بتحديث متصفح الإنترنت الخاص بك.
  2. استخدم متصفح Microsoft Edge.
  3. انقر على الرابط للدخول إلى الموقع.



Home screen layout of the site

Model Building Training

- Imagine you are training a young child to do new things!
  1. You show the young child a picture of a cat and say, "This is a cat."
  2. Then, you show him a picture of a dog and say, "This is a dog."
- By doing this, you're helping the child recognize and name what they see, much like when teaching them the names of letters or numbers.
- By time, the child's brain starts to understand the difference between a cat and a dog after seeing many examples.
- **Similarly**, scientists train computers to understand pictures and sounds.
- Imagine if we want to teach a computer to recognize numbers, we start by showing it pictures of numbers from "0" to "9" and telling it what each number is.
- After a while, the computer will be able to look at any number and tell us what it is.

تدريب بناء النماذج

تخيل أنك تدرب طفلًا صغيرًا على القيام بأشياء جديدة! تظهر للطفل صورة قطة وتقول له، "هذه قطة"، ثم تظهر صورة كلب وتقول له، "هذا كلب".

- من خلال القيام بذلك، تساعد الطفل على التعرف على الأشياء التي يراها وتسميتها، تمامًا كما تفعل عند تعليمه أسماء الحروف أو الأرقام. مع مرور الوقت، يبدأ دماغ الطفل في فهم الفرق بين القطة والكلب بعد رؤية العديد من الأمثلة.
- يشبه ذلك عندما يحاول العلماء تدريب الكمبيوتر على فهم الصور والأصوات.
- تخيل أننا نريد تعليم الكمبيوتر التعرف على الأرقام. يمكننا أن نبدأ بإعطائه صورًا لأرقام من "0-9"، ونخبره بالرقم الموجود في كل صورة. بعد فترة، سيصبح الكمبيوتر قادرًا على النظر إلى أي رقم ويخبرنا ما هو.

The First project on Teachable Machine
المشروع الأول

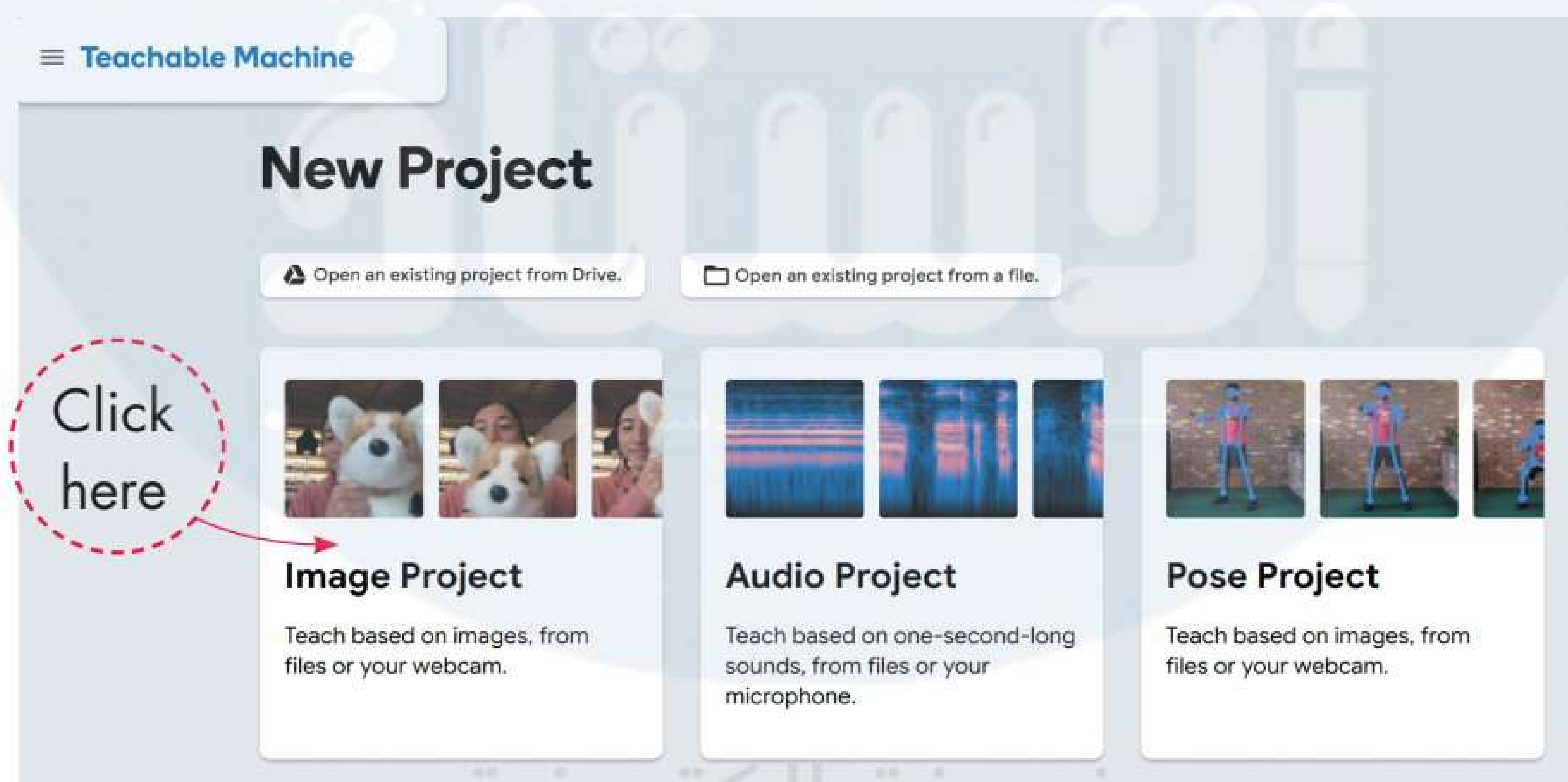
1 Visit the website: https://teachablemachine.withgoogle.com, and click on "Get Started."

1 قم بالدخول على الموقع واضغط على Get Started.



2 You can see three types of projects, click on "Image Project".

2 يمكنك رؤية ثلاثة أنواع من المشاريع، اضغط على مشروع الصور Image Project.



3 The window of New Image Project will appear. Click on "Standard image model."

3 ستظهر نافذة مشروع الصور الجديدة، انقر فوق نموذج الصورة القياسي.

New Image Project ×

Click here

Standard image model	Embedded image model
Best for most uses	Best for microcontrollers
224x224px color images	96x96px greyscale images
Export to TensorFlow, TFLite, and TF.js	Export to TFLite for Microcontrollers, TFLite, and TF.js
Model size: around 5mb	Model size: around 500kb
	See what hardware supports these models.

Project Steps خطوات المشروع

1 Classification:

- This includes:
  1. A group of images that belong to a specific category, such as images of numbers from "0" to "9".
  2. Another group that includes images of alphabet letters.

1- **التصنيف:** يتضمن ذلك:

1 مجموعة الصور التي تنتمي إلى فئة معينة مثل صور الأرقام "من 0 إلى 9".

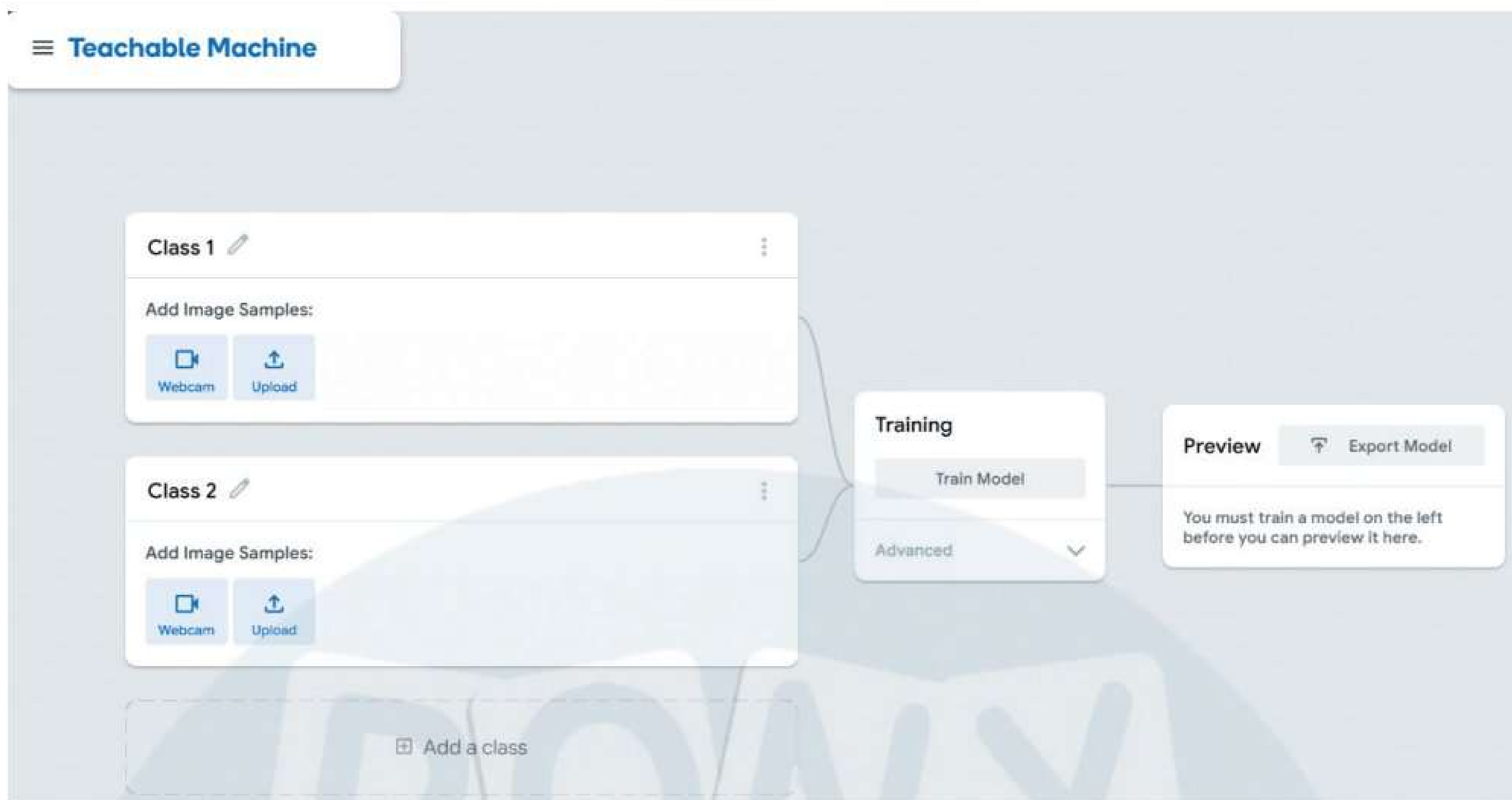
2 مجموعة أخرى تتضمن صورًا للحروف الهجائية.

2 Adding Images:

- Upload images of numbers in (Class 1).
- Open the camera: Prepare images of letters on paperboards and have the model take them in (Class 2).

2- **إضافة الصور:**

- تحميل صور الأرقام في (Class 1).
- قم بفتح الكاميرا: جهز صور للحروف على لوحات ورقية واجعل النموذج يقوم بالتقاطها في (Class 2).



3 Training:

- The artificial intelligence model is trained on the image categories that were given to it.

3- التدريب:

- يتم تدريب نموذج الذكاء الاصطناعي على فئات الصور التي تم إعطاؤها له.

4 Testing:

- After that, the model can be given an image that determines for us which category of images it follows.

4- الاختبار:

- بعد ذلك يمكن إعطاء النموذج صورة تحدد لنا أي فئة من الصور يتبعها.

NOTES:

1. The images were provided to the model in the form of files or through the web camera.
2. You can add more image categories when needed, for example, "adding special symbols".

1. تم توفير الصور للنموذج على شكل ملفات، أو يلتقطها من خلال كاميرا (web camera).
2. يمكنك إضافة المزيد من فئات الصور عند الحاجة، على سبيل المثال "إضافة رموز خاصة".

Save the Project

1. Save the project on Google Drive.
حفظ المشروع على Google Drive.

2. Download the project to the device.
تحميل المشروع علي الجهاز.

Practical Example: Hand Movement Game

» Suppose you want to make a game where you control a character on the screen with your hand movement, here are the steps:

1. **Training:** Record your hand in different positions (such as raising the hand, lowering it, moving it right and left).
2. **Recognition:** Teachable Machine learns to associate each position of your hand with a specific movement of the character on the screen.
3. **Game:** When you move your hand in front of the camera, the character on the screen moves according to what the computer has learned.

مثال عملي: لعبة حركة اليد

لنفترض أنك تريد أن تصنع لعبة تتحكم في شخصية على الشاشة بحركة يدك، فإليك الخطوات:

1. **التدريب:** قم بتصوير يدك في أوضاع مختلفة (مثل رفع اليد وخفضها وتحريكها يمينًا ويسارًا).
2. **التعرف:** تتعلم Teachable Machine ربط كل وضع ليدك بحركة معينة للشخصية على الشاشة.
3. **اللعبة:** عندما تحرك يدك أمام الكاميرا، تتحرك الشخصية على الشاشة وفقًا لما تعلمه الكمبيوتر.

Example Application تطبيق المثال

1. **Access the site:** Open your browser, type "Teachable Machine" in the search bar, and access the site.

1. **الدخول إلى الموقع:** افتح المتصفح الخاص بك واكتب في شريط البحث "Teachable Machine" ثم ادخل إلى الموقع.

2. **Select the training model:** Choose the option related to image recognition (Image).

2. **اختيار نموذج التدريب:** اختر الخيار الذي يتعلق بالتعرف على الصور (Image).

3. **Prepare the camera:** Choose to upload images (Upload) or allow the site to use your device's camera (Webcam). Ensure good lighting and a simple background so that the computer focuses on the movement of your hand.

3. **تجهيز الكاميرا:** سيطلب منك الموقع اختيار رفع الصور (Upload) أو السماح له باستخدام كاميرا جهازك. (Webcam).
اضغط على الكاميرا وتأكد من أن الإضاءة جيدة وأن خلفية الكاميرا بسيطة حتى يركز الكمبيوتر على حركة يدك.

4 Train the computer:

- **Create Classes:** Create at least two classes (Class 1) and (Class 2), for example, (Class 1) 'Raised hand' and (Class 2) 'Shaky hand'.
- **Record examples:** Record several examples of corresponding hand movements. For example, in front of the category 'raised hand,' raise your hand several times, each time with a different movement or shape. Do the same for the category 'shaky hand'.
- **Review examples:** Make sure that the examples are clear and that the computer understands the difference between the two movements.
- **Training:** After you finish taking the pictures, click on the "Train Model" button to teach the computer these movements.

4 تدريب الكمبيوتر:

- **إنشاء الفئات Classes :** قم بإنشاء فئتين (Class 1) و (Class 2) على الأقل، مثلاً (Class 1) "يد مرفوعة" و (Class 2) "يد مهزوزة".
- **تسجيل الأمثلة:** أمام كل فئة، قم بتسجيل عدة أمثلة لحركة اليد المقابلة، مثلاً، أمام فئة "يد مرفوعة"، ارفع يدك عدة مرات وفي كل مرة ارفعها بحركة معينة أو شكل مختلف، وهكذا أمام فئة "يد مهزوزة".
- **مراجعة الأمثلة:** تأكد من أن الأمثلة واضحة وأن الكمبيوتر يفهم الفرق بين الحركتين.
- **التدريب:** بعد الانتهاء من التقاط الصور، اضغط على زر "Train Model" لتعليم الكمبيوتر هذه الحركات.

5 Test the model: After you finish training, the site will ask you to test the model.

- **Camera:** Point the camera at your hand and perform the movements you trained.
- **Results:** You will see that the computer will try to guess the movement you are performing.

5 اختبار النموذج: بعد الانتهاء من التدريب، سيطلب منك الموقع اختبار النموذج.

- **الكاميرا:** وجه الكاميرا إلى يدك وقم بعمل الحركات التي قمت بتدريبها.
- **النتائج:** سترى أن الكمبيوتر سيحاول تخمين الحركة التي تقوم بها.

6 Save the model: If you like the model, you can save it and use it in other projects.

6 حفظ النموذج: إذا أعجبك النموذج، يمكنك حفظه واستخدامه في مشاريع أخرى.

أهم الكلمات والمصطلحات			
Artificial intelligence	الذكاء الاصطناعي	Expert systems	الأنظمة الخبيرة
Narrow AI	الذكاء الاصطناعي الضيق	Machine learning	التعلم الآلي
General AI (GAI)	الذكاء الاصطناعي العام	Robotics	الروبوتات
Super AI (SAI)	الذكاء الاصطناعي الفائق	Natural Language Processing	معالجة اللغة الطبيعية
Personal assistant	المساعد الشخصي	Computer vision	الرؤية الحاسوبية
Smart games	الألعاب الذكية	Deep learning	التعلم العميق
Smart cars	السيارات الذكية	Neural networks	الشبكات العصبية
Digital doctors	الأطباء الرقميون	Image recognition	التعرف على الصور
Instant translator	المترجم الفوري	Sound recognition	التعرف على الأصوات
Smart shopping	التسوق الذكي	Movement recognition	التعرف على الحركات
Precise surgery	جراحة دقيقة	Mimic a human	يحاكي الانسان
Diagnose	يشخص		

Notes

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Exercises on Lesson 1

1 Choose the correct answer:

1. Artificial intelligence is ....
   a. limited to one task b. used in many fields
   c. only for games d. not useful in daily life
2. .... is a type of AI that focuses on performing specific tasks.
   a. Narrow AI b. General AI
   c. Super AI d. None of them
3. .... is an example of General Artificial Intelligence (GAI).
   a. A chess-playing robot b. A robot that mimics humans
   c. Siri d. None of the previous
4. Super AI can ....
   a. solve simple problems b. only play games
   c. only mimic humans d. solve complex problems
5. Natural Language Processing enables AI to ....
   a. recognize images b. understand human languages
   c. perform surgeries d. drive cars
6. Personal assistants, such as ...., understand your commands and perform them.
   a. Siri b. Alexa c. Scratch d. both a and b
7. .... sites use AI to suggest products based on your purchasing behavior.
   a. Smart games b. Smart shopping
   c. Digital doctors d. Instant translator
8. .... is a field of AI that involves learning from mistakes.
   a. Machine Learning b. Natural Language Processing
   c. Computer Vision d. Robotics

9 .... is a field of AI that enables computers to interpret visual information.

a. Robotics
b. Computer Vision
c. Deep Learning
d. Natural Language Processing

10 .... is a tool that helps you create models to recognize images, sounds, and movements.

a. Google Drive
b. Microsoft Edge
c. Teachable Machine
d. Alexa

11 Deep learning mainly relies on ....

a. neural networks
b. databases
c. robotics
d. language models

12 Deep learning enables computers to ....

a. simplify tasks
b. only play games
c. only recognize images
d. learn complex tasks

13 Expert system means AI can ....

a. solve complex problems
b. make difficult decisions
c. understand languages
d. both a and b

14 Teachable Machine helps create models to recognize ....

a. images only
b. sounds only
c. movements only
d. all of them

15 Which of the following is NOT a field of artificial intelligence?

a. Machine Learning
b. Internet Browsing
c. Robotics
d. Computer Vision

16 The first step in model building training is ....

a. testing
b. teaching
c. saving
d. none of them

17 What should you do after training an AI model on Teachable Machine?

a. Delete the project.
b. Restart the computer.
c. Test the model.
d. Change the browser.

18 You can save a Teachable Machine project on ....

a. Google Drive
b. your device
c. both a and b
d. none of them

2 Put (✓) or (✗):

1. Personal assistants, like Siri and Alexa, use artificial intelligence. ( )
2. 📖 Artificial intelligence is only used in the video game industry. ( )
3. 📖 Artificial intelligence can help doctors diagnose diseases. ( )
4. Self-driving cars depend entirely on artificial intelligence. ( )
5. Artificial intelligence can learn new things slowly. ( )
6. 📖 Artificial intelligence is a science of computer science. ( )
7. For artificial intelligence to become intelligent, it needs small amounts of information. ( )
8. Artificial intelligence is only one type. ( )
9. Artificial intelligence fields include Deep Learning, Machine Learning, and Natural Language Processing. ( )
10. Narrow artificial intelligence can perform any task that a human can perform. ( )
11. General artificial intelligence is more advanced than narrow artificial intelligence. ( )
12. 📖 Super artificial intelligence can solve specific problems. ( )
13. 📖 Smart games are used to make playing games more fun. ( )
14. 📖 Instant translator is used to facilitate communication between people. ( )
15. 📖 Smart shopping gives you suggestions for products you might like. ( )
16. 📖 General artificial intelligence focuses on performing a specific task. ( )
17. 📖 Natural Language Processing is like a machine language translator. ( )
18. 📖 Robots are very good at doing a lot of things with great accuracy. ( )
19. Teachable Machine helps create intelligent models to recognize images. ( )

3 Complete the following sentences:

1. .... is the most advanced type of AI.
2. Deep learning depends mainly on ....
3. .... enables AI to understand and respond to human languages.
4. .... is a tool that helps create AI models to recognize images, sounds, and movements.
5. .... is a type of AI that can perform any task a human can do.

4 Arrange the following steps to train a Teachable Machine model:

1. (   ) Upload images or capture examples for each category.
2. (   ) Test the model with new images to classify them.
3. (   ) Access Teachable Machine and start a New Project.
4. (   ) Train the AI model to recognize patterns.
5. (   ) Choose the model type (e.g., Image Recognition).

Notes

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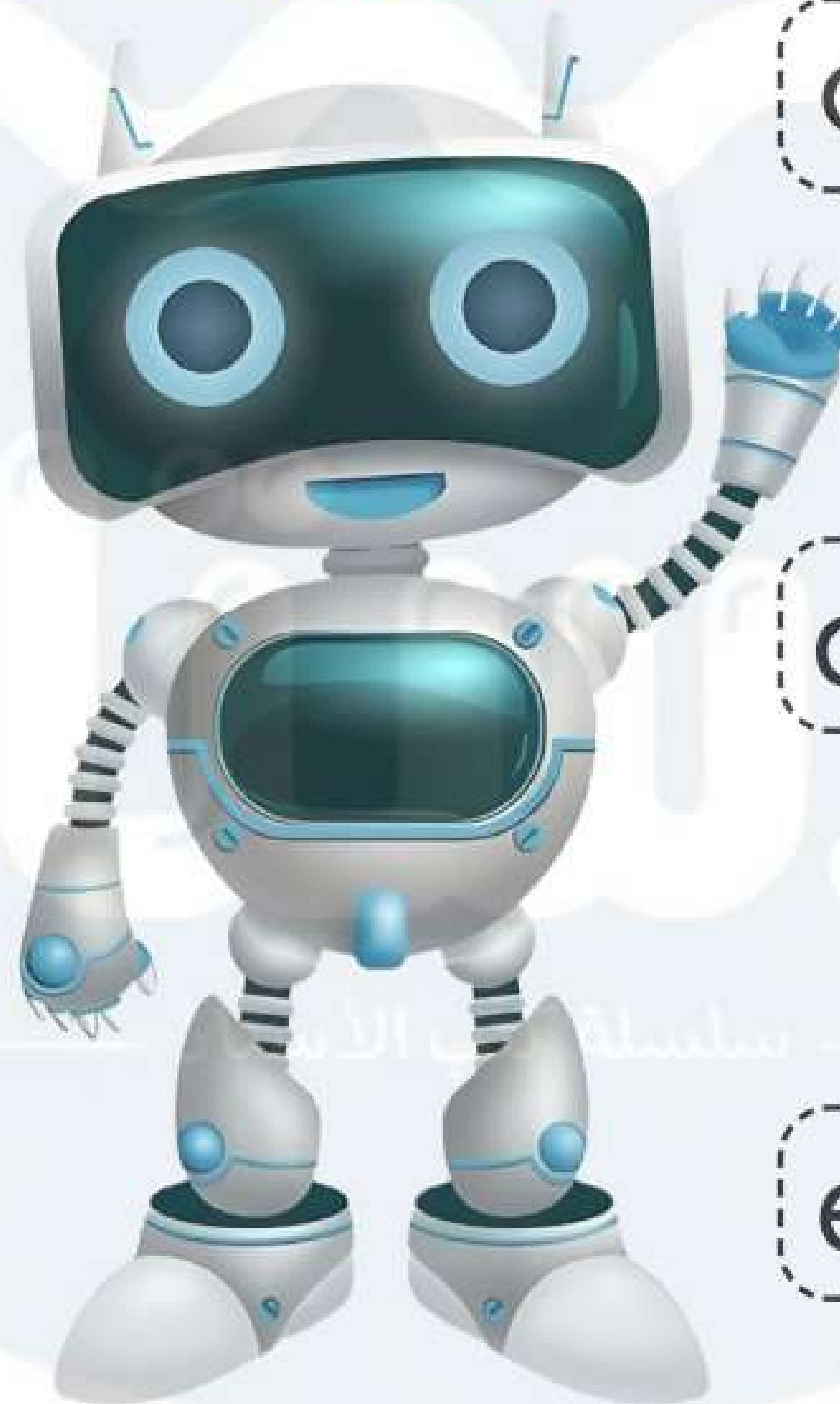
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Play with PONY

Simulation of human thinking and decision-making	1	a	Machine Learning
Distinguishing between pictures	2	b	Natural Language processing
Smart robots that do many tasks	3	c	Computer Vision
Intelligent language translator	4	d	Robotics
Simulation of human learning	5	e	Expert Systems
Learning from mistakes	6	f	Deep Learning



Help the robot match the artificial intelligence fields.



Lesson 2

Sensors

» Sensors are simple devices that play a major role in our daily lives.

Sensors are used in:

Robots	Smartphones	Modern cars	Alarms

» We will learn together how these devices work, what their types are, and review real-life examples that help us understand how they work and how they are used in electronic devices and robots.

« أجهزة الاستشعار هي أجهزة بسيطة تلعب دورًا رئيسيًا في حياتنا اليومية.

« أجهزة الاستشعار تستخدم في:

1 الروبوتات 2 الهواتف الذكية 3 السيارات الحديثة 4 أجهزة الإنذار

« سنتعلم معًا كيف تعمل هذه الأجهزة، وما هي أنواعها، وسنستعرض أمثلة من الحياة الواقعية تساعدنا على فهم كيفية عملها وكيفية استخدامها في الأجهزة الإلكترونية والروبوتات.

Sensors

- They are devices that sense changes in the surrounding environment and convert them into signals so that machines and devices can understand them and make appropriate decisions based on them.
- They are considered the eyes and ears of machines.

• **أجهزة الاستشعار:** هي أجهزة تستشعر التغيرات في البيئة المحيطة وتحولها إلى إشارات حتى تتمكن الآلات والأجهزة من فهمها واتخاذ القرارات المناسبة بناءً عليها. فهي تعتبر بمثابة عيون وآذان الآلات.

How Do Sensors Work?

» Sensors act as a translator that translates those sensations (such as heat, light, or sound) into numbers (numeric data), which is the language the computer understands.

Heat
Light → Sensors → Numbers (Numeric data)
Sound

كيف تعمل أجهزة الاستشعار؟

أجهزة الاستشعار عبارة عن مترجم يقوم بترجمة تلك الإحساسات (مثل الحرارة، الضوء، الصوت) إلي لغة يفهمها الكمبيوتر وهي لغة الأرقام.

Sensors work through three steps:

1. **Sensing:** They capture information from the surrounding environment (such as heat, light, or sound).
2. **Signal conversion:** They convert this information into electrical signals that can be read by electronic devices.
3. **Transmission:** They send signals to another device to display the results or perform a specific operation.
   For example: A thermometer displays the temperature on a digital screen.

تعمل أجهزة الاستشعار من خلال 3 خطوات رئيسية:

1. الاستشعار: تلتقط المعلومات من البيئة المحيطة (مثل الحرارة، الضوء، الصوت).
2. تحويل الإشارات: تحول هذه المعلومات إلي إشارات كهربائية يمكن أن تقرأها الأجهزة الإلكترونية.
3. الإرسال: ترسل الإشارات إلي جهاز آخر ليعرض النتائج أو ينفذ عملية معينة، فمثلا الترمومتر يظهر نتيجة درجة الحرارة علي الشاشة الرقمية.

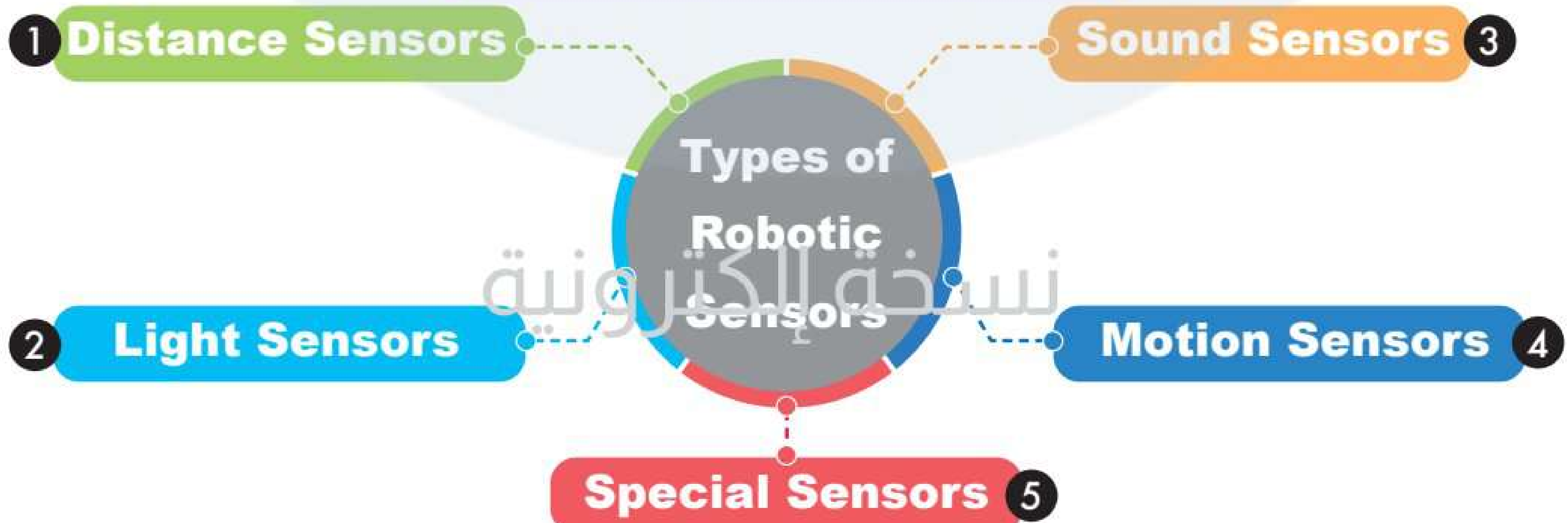
Importance of Sensors for Robots

- Robots without sensors are like a person walking with their eyes closed and their ears covered. They cannot recognize what is happening around them.
- Sensors represent the "senses" of the robot that help them see, hear, sense, and even touch things around it.

أهمية أجهزة الاستشعار للروبوتات:

- الروبوتات بدون أجهزة استشعار، مثل شخص يمشي مغمض العينين ومغطي الأذنين، فلا يمكنها أن تتعرف علي ما يحدث حولها.
- أجهزة الاستشعار تمثل "حواس" الروبوت فتساعده علي الرؤية، السماع، الاستشعار، وحتي لمس الأشياء من حوله.

Types of Robotic Sensors



» There are many different types of sensors used in robots; each type has a specific function.

• أنواع أجهزة الاستشعار الروبوتية: هناك العديد من الأنواع المختلفة لأجهزة الاستشعار التي تستخدم في الروبوتات، ولكل نوع منها وظيفة معينه.

Examples:

1 Distance Sensors:

» They measure the distance between the robot and surrounding obstacles to avoid collisions.

1 أجهزة استشعار المسافة: تقيس المسافة بين الروبوت والعوائق المحيطة به لتجنب الاصطدام.

2 Light Sensors:

» They help the robot adapt to changing light conditions.

» They are used in robots that operate in places where light is variable, such as home robots.

2 أجهزة استشعار الضوء: تساعد الروبوت علي التكيف مع تغيرات الإضاءة.

• تستخدم في الروبوتات التي تعمل في أماكن يكون فيها الضوء متغيرًا مثل الروبوتات المنزلية.

3 Sound Sensors:

» They are used in robots that react to sounds to help them respond to voice commands.

3 أجهزة استشعار الصوت: تستخدم في الروبوتات التي تتفاعل مع الأصوات، لتمكنهم من الاستجابة للأوامر الصوتية.

4 Motion Sensors:

» They detect movement and changes in direction to help the robot navigate and interact with surrounding objects.

4 أجهزة استشعار الحركة: تكشف الحركة وتغيرات الاتجاه، لكي تساعد الروبوت علي التنقل والتفاعل مع الأشياء المحيطة.

5 Special Sensors:

» Such as temperature and humidity sensors.

5 أجهزة الاستشعار الخاصة: مثل أجهزة استشعار درجات الحرارة والرطوبة.

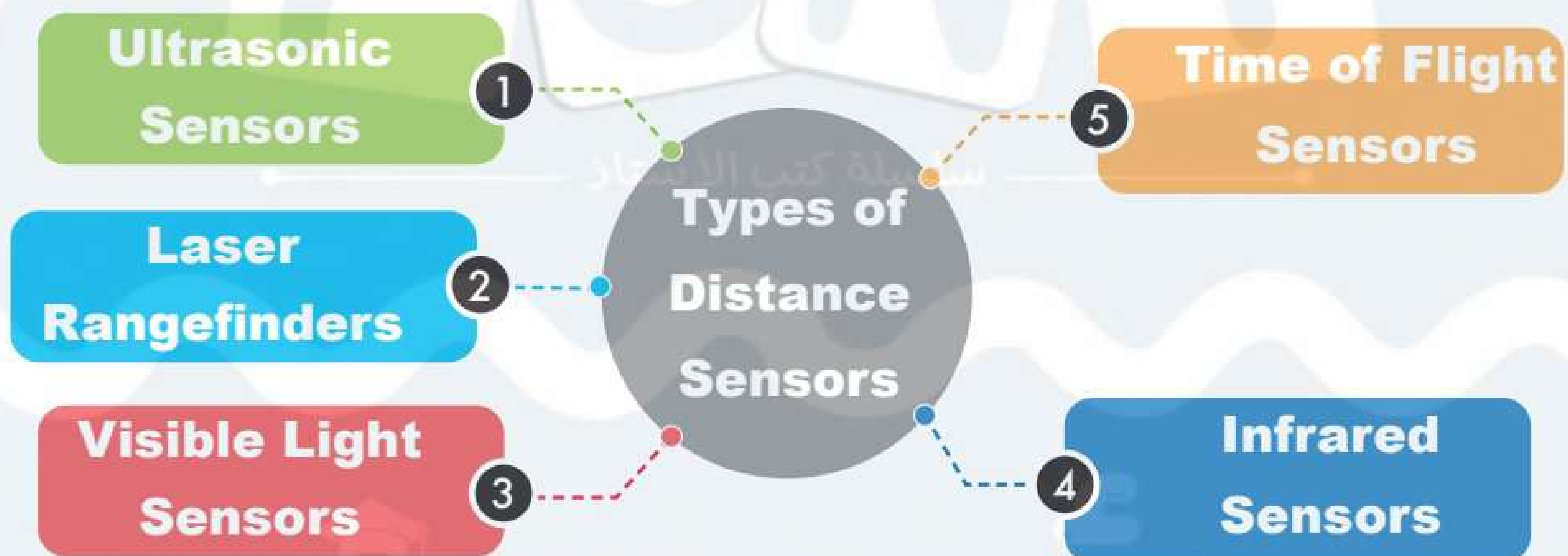
Examples of Electronic Devices That Use Sensors

1. **Vacuum cleaner robot:** It uses sensors to avoid obstacles and clean under furniture.
2. **Surgical robot:** It uses precise sensors to perform surgeries.
3. **Self-driving cars:** They rely heavily on sensors to see the road and make decisions.

• أمثلة لأجهزة إلكترونية يستخدم بها أجهزة الاستشعار:

1. الروبوت المكنسة الكهربائية: يستخدم أجهزة استشعار لتجنب العقبات والتنظيف تحت الأثاث.
2. الروبوت الجراح: يستخدم أجهزة الاستشعار الدقيقة لإجراء العمليات الجراحية.
3. السيارات ذاتية القيادة: تعتمد بشكل كبير علي أجهزة الاستشعار لرؤية الطريق واتخاذ القرارات.

Types of Distance Sensors



- The types of distance sensors used in robots and smart devices vary.
- Each type has its own advantages and uses.

أنواع أجهزة استشعار المسافة:

• تتنوع أنواع أجهزة استشعار المسافة المستخدمة في الروبوتات والأجهزة الذكية.

• لكل نوع مميزاته واستخداماته الخاصة.

1 Ultrasonic Sensors:

Working principle:



- They emit high-frequency sound waves, and then receive the returning waves after they bounce off an object.
- By measuring the time it takes for the wave to return, the distance to the object can be calculated.

Examples:

1. **Vacuum cleaner robots:** locate furniture and obstacles to avoid colliding with them.
2. **Parking systems:** measure the distance between the car and surrounding obstacles.
3. **Fluid levels:** measure the level of fluids in tanks and reactors.

أجهزة استشعار الموجات فوق الصوتية:

- مبدأ العمل: تصدر موجات فوق صوتية عالية التردد، ثم تستقبل الموجات العائدة بعد ارتدادها عن جسم ما.
- من خلال قياس الوقت الذي تستغرقه الموجه حتى العودة، يمكن حساب المسافة إلى الجسم.

أمثلة:

1. روبوتات المكنسة الكهربائية: تستخدم هذه الأجهزة لتحديد موقع الأثاث والعوائق لتجنب الاصطدام بها.
2. أنظمة ركن السيارات: تساعد في قياس المسافة بين السيارة والعوائق المحيطة بها.
3. مستويات السوائل: تستخدم لقياس مستوي السوائل في الخزانات والمفاعلات.

2 Laser Rangefinders:

Working principle:

- They emit a laser beam, and then measure the time it takes for the beam to return after bouncing off the object.
- They are characterized by high accuracy and a longer range compared to ultrasonic devices.



Examples:

1. **3D laser scanners:** create 3D models of spaces.
2. **Ground scanning systems:** are used in geological and archaeological surveys.
3. **Industrial measurement systems:** measure dimensions with high accuracy in various industries.

أجهزة استشعار الليزر:

- مبدأ العمل: تصدر هذه الأجهزة شعاع ليزر ثم تقيس الوقت الذي يستغرقه الشعاع للعودة بعد ارتداده عن الجسم.
- تتميز بدقة عالية ومدى أطول مقارنة بالأجهزة فوق الصوتية.

أمثلة:

1. ماسحات الليزر ثلاثية الأبعاد: تستخدم في إنشاء نماذج ثلاثية الأبعاد للمساحات.
2. أنظمة المسح الأرضي: تستخدم في المسح الجيولوجي والمسح الأثري.
3. أنظمة القياس الصناعية: تستخدم في قياس الأبعاد بدقة عالية في الصناعات المختلفة.

3 Visible Light Sensors:

Working principle:

» They use digital cameras to analyze images and determine the distance to objects based on the size and distortion of the image.

Examples:

1. **Self-driving car cameras:** determine the distance to other cars, pedestrians, and traffic signals.
2. **Industrial vision systems:** inspect products and identify errors.
3. **Augmented reality systems:** integrate digital elements with the real world.

أجهزة استشعار الضوء المرئي:

• مبدأ العمل: تستخدم هذه الأجهزة كاميرات رقمية لتحليل الصور وتحديد المسافة إلى الأجسام بناء على حجم الصورة وتشوهها.

أمثلة:

1. كاميرات السيارات ذاتية القيادة: تستخدم لتحديد المسافة إلى السيارات الأخرى والمشاة وإشارات المرور.
2. أنظمة الرؤية الصناعية: تستخدم في فحص المنتجات وتحديد الأخطاء.
3. أنظمة الواقع المعزز: تستخدم لدمج العناصر الرقمية مع العالم الحقيقي.

4 Infrared Sensors:

Working principle:

» They emit infrared rays, and then receive the returning rays after they bounce off the object. They are widely used in **consumer electronics**.



Examples:

1. **Remote controls:** use infrared rays to communicate with electronic devices.
2. **Non-contact thermometers:** are used to measure body temperature without the need for direct contact.

أجهزة استشعار الأشعة تحت الحمراء:

• مبدأ العمل: تصدر هذه الأجهزة أشعة تحت حمراء ثم تستقبل الأشعة العائدة بعد ارتدادها عن الجسم، تستخدم على نطاق واسع في الأجهزة الإلكترونية الاستهلاكية.

أمثلة:

1. أجهزة التحكم عن بعد: تستخدم الأشعة تحت الحمراء للتواصل مع الأجهزة الإلكترونية.
2. أجهزة قياس الحرارة اللا تلامسيه: تستخدم لقياس درجة حرارة الجسم دون الحاجة إلى التلامس المباشر.

5 Time of Flight Sensors:

Working principle:

- They measure the time it takes for a light pulse to reach an object and return to it.
- They are characterized by high accuracy and high speed.

Examples:

1. **3D sensors:** are used to create 3D models of objects.
2. **Motion tracking systems:** are used in video games and virtual reality systems.

أجهزة استشعار وقت الرحلة:

- مبدأ العمل: تعتمد علي قياس الوقت الذي يستغرقه نبضة ضوئية للوصول إلي جسم ما والعودة إليه، تتميز بدقة عالية وسرعة عالية.

أمثلة:

1. أجهزة الاستشعار ثلاثية الأبعاد: تستخدم في إنشاء نماذج ثلاثية الأبعاد للأشياء.
2. أنظمة تتبع الحركة: تستخدم في ألعاب الفيديو وأنظمة الواقع الافتراضي.

Factors for Choosing the Appropriate Type of Sensor

1. **Required range:** The maximum distance that the device must measure.
2. **Required accuracy:** The required measurement accuracy.
3. **Operating environment:** The environmental conditions in which the device will operate (lighting, temperature, humidity).
4. **Cost:** The cost of the device and installation.

By choosing the appropriate device, robots and smart devices can interact with their environment more accurately and effectively.

عوامل اختيار نوع جهاز الاستشعار المناسب:

1. **المدى المطلوب:** المسافة القصوى التي يجب علي الجهاز قياسها.
2. **الدقة المطلوبة:** مدي دقة القياس المطلوبة.
3. **البيئة التشغيلية:** الظروف البيئية التي سيعمل فيها الجهاز (الإضاءة، الحرارة، الرطوبة).
4. **التكلفة:** تكلفة الجهاز والتركيب.

باختيار الجهاز المناسب، يمكن للروبوتات والأجهزة الذكية أن تتفاعل مع بيئتها بشكل أكثر دقة وفاعلية.

Daily Applications of Sensors
التطبيقات اليومية لأجهزة الاستشعار

Sensors are used daily in our lives, and the most prominent of these applications are:

1. **In smartphones:** Sensors help in taking pictures, adjusting the lighting level, and even determining the location of the phone.
2. **In modern cars:** Sensors are used to determine speed, warn of collisions, and help the driver park his car.
3. **In smart homes:** Motion sensors turn on the lights automatically when someone enters the room.
4. **Phone microphone:** It is a sound sensor that converts the sound you pick up into electrical signals that can be understood by the phone.
5. **Motion sensor in games:** When you tilt your phone to the right or left while playing a game, the motion sensor tells the game to change the direction of the character.
6. **Touch screen:** It is a group of small sensors that sense where your finger touches the screen.

تستخدم أجهزة الاستشعار بشكل يومي في حياتنا، ومن أبرز هذه التطبيقات:

1. **في الهواتف الذكية:** تساعد أجهزة الاستشعار في التقاط الصور، وضبط مستوي الإضاءة، وحتي تحديد موقع الهاتف.
2. **في السيارات الحديثة:** تستخدم أجهزة الاستشعار في تحديد السرعة، الحذر من الاصطدام، ومساعدة السائق في ركن سيارته.
3. **في المنازل الذكية:** أجهزة استشعار الحركة تضئ الأضواء تلقائيًا عند دخول شخص الغرفة.
4. **ميكروفون الهاتف:** هو جهاز استشعار للصوت يحول الصوت الذي تلتقطه إلى إشارات كهربائية يمكن فهمها بواسطة الهاتف.
5. **جهاز استشعار الحركة في الألعاب:** عندما تميل هاتفك جهة اليمين أو اليسار أثناء لعب لعبة ما، فإن جهاز استشعار الحركة هو الذي يخبر اللعبة بأن تقوم بتغيير اتجاه الشخصية.
6. **شاشة اللمس:** هي عبارة عن مجموعة أجهزة الاستشعار الصغيرة التي تستشعر مكان لمس إصبعك علي الشاشة.

أهم الكلمات والمصطلحات			
Sensors	أجهزة الاستشعار	Infrared sensors	أجهزة استشعار الأشعة تحت الحمراء
Modern technology	التكنولوجيا الحديثة	Time of flight sensors	أجهزة استشعار زمن الطيران
Robots	الروبوتات	Self-driving cars	السيارات ذاتية القيادة
Smartphones	الهواتف الذكية	Surgical robot	روبوت جراحي
Alarms	أجهزة الإنذار	Vacuum cleaner robot	روبوت مكنسة كهربائية
Signal conversion	تحويل الإشارة	Motion tracking	تتبع الحركة
Electrical signals	إشارات كهربائية	Operating environment	بيئة التشغيل
Transmission	الإرسال	Measurement accuracy	دقة القياس
Real-life examples	أمثلة من الواقع	Touch screen	شاشة اللمس
Ultrasonic sensors	أجهزة استشعار فوق صوتية	Sound sensor	حساس الصوت
Laser rangefinders	مقاييس مدى الليزر	Augmented reality	الواقع المعزز
Visible light sensors	أجهزة استشعار الضوء المرئي	Digital screen	شاشة رقمية
Motion sensors	أجهزة استشعار الحركة	Fluid levels	مستويات السوائل
Obstacles	العوائق	Avoid collision	تجنب الاصطدام
Bounce off	ارتداد	Image distortion	تشوه الصورة



Exercises on Lesson 2

1 Choose the correct answer:

1. 📖 The main function of the sensor is to ....
   a. store data
   b. capture environmental changes and convert them into signals
   c. display images
   d. produce sound

2. 📖 Sensors help robots to ....
   a. teach them new languages
   b. allow them to interact with their environment
   c. increase their size
   d. slow down their operations

3. 📖 .... are used to avoid obstacles.
   a. Light sensors
   b. Sound sensors
   c. Distance sensors
   d. Heat sensors

4. 📖 The first step in the operation of a sensor is ....
   a. transmitting
   b. displaying
   c. sensing
   d. transduction

5. 📖 .... are commonly used in remote controls.
   a. Ultrasonic sensors
   b. Infrared sensors
   c. Light sensors
   d. Motion sensors

6. What step comes after Signal Conversion in the operation of sensors?
   a. Sensing
   b. Transmission
   c. Data Processing
   d. Displaying Results

7. 📖 Laser rangefinders are accurate because they use ....
   a. sound waves
   b. visible light
   c. high frequency waves
   d. laser beams

8. Which of these factors is NOT important when choosing the appropriate type of sensor?
   a. Required range
   b. Required accuracy
   c. Operating environment
   d. Brand popularity

9 A common application of sensors is the use of infrared in ....
a. smartphones
b. remote controls
c. vacuum cleaners
d. 3D scanning

10 In which environment are light sensors useful?
a. In dark rooms
b. In noisy factories
c. In places with variable lighting conditions
d. In underwater environments

11 One of the sensors that are used to measure distance using high-frequency sound waves is ....
a. ultrasonic sensors
b. laser rangefinders
c. infrared sensors
d. motion sensors

12 .... sensors are used to turn on lights when someone enters the room.
a. Smartphone
b. Smart car
c. Smart home lighting system
d. Smart watch

13 .... are used for non-contact temperature measurement.
a. Ultrasonic sensors
b. Infrared sensors
c. Light sensors
d. Motion sensors

14 .... is the main purpose of the signal conversion step in sensors.
a. Displaying the results
b. Sending the signals to another device
c. Converting the information into electrical signals
d. Turning off the sensor

15 .... help cars determine the distance to other vehicles.
a. Sound sensors
b. Light sensors
c. Infrared sensors
d. Distance sensors

16 .... is the practical use of motion sensors in games.
a. Changing the volume
b. Adjusting the brightness of the screen
c. Tracking the movements of players
d. Improving the sound quality

17 Factors that determine the choice of a sensor for a particular application include the ....

a. brand of the device
b. color of the device
c. environment and required accuracy
d. size of the device

2 Put (✓) or (✗):

1. Sensors are devices that sense changes in the environment and convert them into signals. ( )
2. Sensors are not used in smartphones. ( )
3. Sensors are considered the eyes and ears of machines. ( )
4. The cost of a sensor is not a significant factor when choosing the appropriate type. ( )
5. Sensors work by capturing information, then converting it into electrical signals. ( )
6. A thermometer displays the temperature result on a digital screen. ( )
7. Robots can recognize their surroundings without sensors. ( )
8. Distance sensors help robots avoid collisions. ( )
9. Light sensors are used in robots that operate in places with constant light. ( )
10. Sound sensors are used in robots that react to sounds. ( )
11. Motion sensors detect movement and changes in direction. ( )
12. Ultrasonic sensors emit light waves to measure distance. ( )
13. Touch screens rely on sensors to detect where a finger touches the screen. ( )
14. Laser rangefinders are less accurate than ultrasonic sensors. ( )
15. Visible light sensors use infrared rays to determine the distance to objects. ( )
16. Infrared sensors are not used in consumer electronics. ( )
17. Time of flight sensors measure the time it takes for a light pulse to reach an object and return. ( )

18 Choosing the appropriate sensor depends on factors, such as range, accuracy, environment, and cost. ( )

3 Match:

Column (A)	Column (B)
1 An ultrasonic sensor	a. detects changes in light conditions.
2 An infrared sensor	b. creates 3D models of spaces.
3 A laser rangefinder	c. communicates with remote controls.
4 A visible light sensor	d. measures body temperature without contact.
5 A temperature sensor	e. measures distance using sound waves.

1 ………… 2 ………… 3 ………… 4 ………… 5 …………

4 Arrange the following steps in the correct order of how sensors work:

A. Transmission B. Sensing C. Signal Conversion

5 Fill in the blanks:

1 The three main steps in how sensors work are ……………………, ……………………, and ………………………… .

2 Ultrasonic sensors use high frequency …………………… waves to measure the distance to an object.

3 Laser rangefinders are characterized by their high ………………………… and longer range

4 Visible light sensors use ………………………… to analyze images.

5 Distance sensors help robots avoid ………………………… by measuring the distance to obstacles.

Play with PONY





Help the robot sort the examples of the types of distance sensors:

(Motion tracking systems – Non-contact thermometers – Self-driving car cameras – 3D laser scanners – Vacuum cleaner robots – 3D sensors – Augmented reality systems – Parking systems – Fluid levels – Ground scanning systems – Industrial vision systems – Industrial measurement systems – Remote controls)

1 **Ultrasonic**

2 **Laser Rangefinders**

3 **Visible Light**

4 **Infrared**

5 **Time of Flight**

Test Yourself on Lessons 1&2

1 Choose the correct answer:

1. The first step in the operation of the sensor is ....
   a. transmitting b. displaying c. sensing d. transduction
2. .... is from artificial intelligence fields.
   a. Computer vision b. Deep energy
   c. AR d. None of them
3. Machine Learning mean ....
   a. understanding languages b. seeing the world
   c. learning from mistakes d. deep learning
4. .... sensors are used to avoid obstacles.
   a. Light b. Sound c. Distance d. Heat
5. .... AI can perform any task a human can do.
   a. Narrow b. General c. Super d. Machine
6. .... help(s) AI understand and process human languages.
   a. Learning b. Vision c. NLP d. Robotics
7. Which factor is NOT considered when choosing a sensor?
   a. Required accuracy b. Operating environment
   c. The robot's speed d. Cost

2 Put (✓) or (✗):

1. General artificial intelligence is the most advanced. ( )
2. Self-driving cars use sensors to assist in driving. ( )
3. Transmission is the third step in the operation of sensors. ( )
4. Visible light sensors use infrared rays to detect objects. ( )
5. Using Teachable Machine requires advanced programming skills. ( )
6. Narrow AI can perform any task that a human can perform. ( )
7. Motion sensors are used in measuring the distance between the robot and surrounding obstacles. ( )
8. AI can look at a picture and tell you everything in it. ( )

Lesson 3

Robots

A robot

- It is a device that can be programmed to perform a set of specific tasks automatically.

• الروبوت: هو جهاز يمكن برمجته لأداء مجموعة من المهام المحددة بشكل أوتوماتيكي.

» A robot can move, sense (via sensors), and interact with its surroundings

» It can be used in environments that require precision and speed of performance.

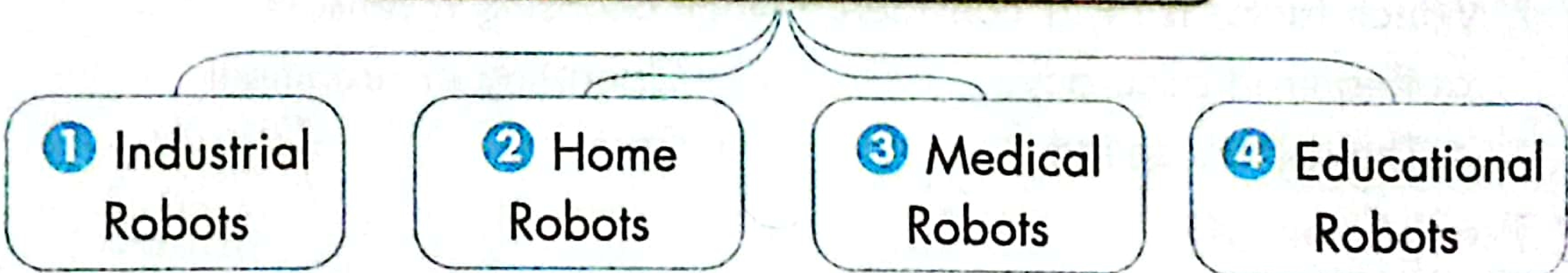
» Example: When we see a vacuum cleaner moving by itself in the house to clean the floor, this is a type of robot that works independently.



» يستطيع الروبوت التحرك والإحساس (عن طريق المستشعرات) والتفاعل مع محيطه، ويمكن استخدامه في بيئات تتطلب دقة وسرعة في الأداء.

» مثال: عندما نرى مكنسة كهربائية تتحرك وحدها في المنزل لتنظيف الأرض، فهذا نوع من الروبوتات التي تعمل بشكل مستقل.

1- Types of Robots أنواع الروبوتات



» There are several types of robots, including:

» هناك عدة أنواع من الروبوتات، منها:

1 Industrial Robots:

» They are used in factories to perform work with high accuracy.

» Examples: Robots that work in car production plants on production lines quickly and accurately



1 الروبوتات الصناعية:

• هي روبوتات تُستخدم في المصانع، فتستطيع أداء الأعمال بدقة عالية، مثل الروبوتات التي تعمل في مصانع إنتاج السيارات في خطوط الإنتاج بسرعة ودقة.

2 Home Robots:



- They are found in homes.
- They are cleaning robots.
- **Examples:** Roomba that helps clean floors without any human effort like smart vacuums.

2 الروبوتات المنزلية:

• هذه الروبوتات توجد في المنازل، وهي روبوتات للتنظيف، مثل المكانس الذكية مثل Roomba التي تساعد في تنظيف الأرضيات بدون أي جهد بشري.

3 Medical Robots:

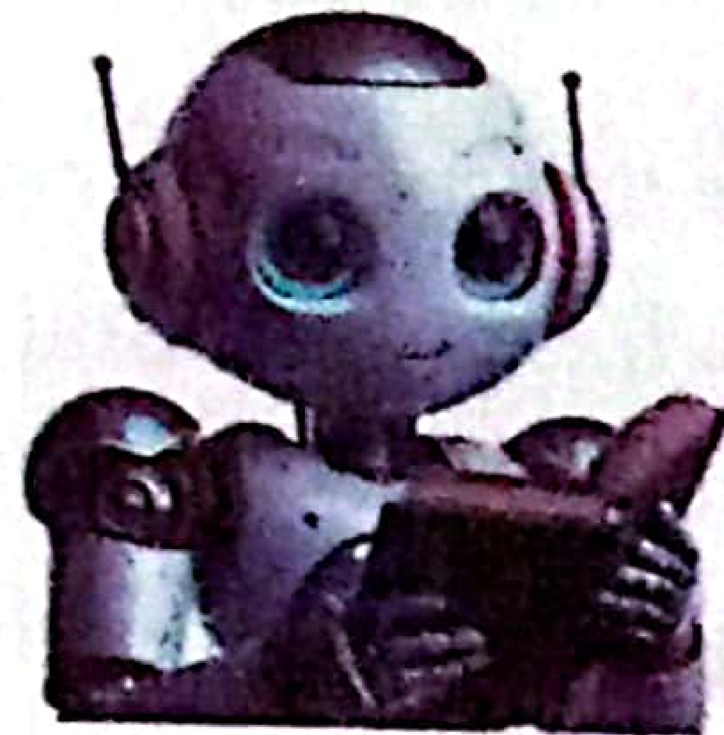


- They help doctors perform surgeries.
- They are very accurate.

3 الروبوتات الطبية:

• تساعد الأطباء في إجراء الجراحات، وهي دقيقة جدًّا.

4 Educational Robots:

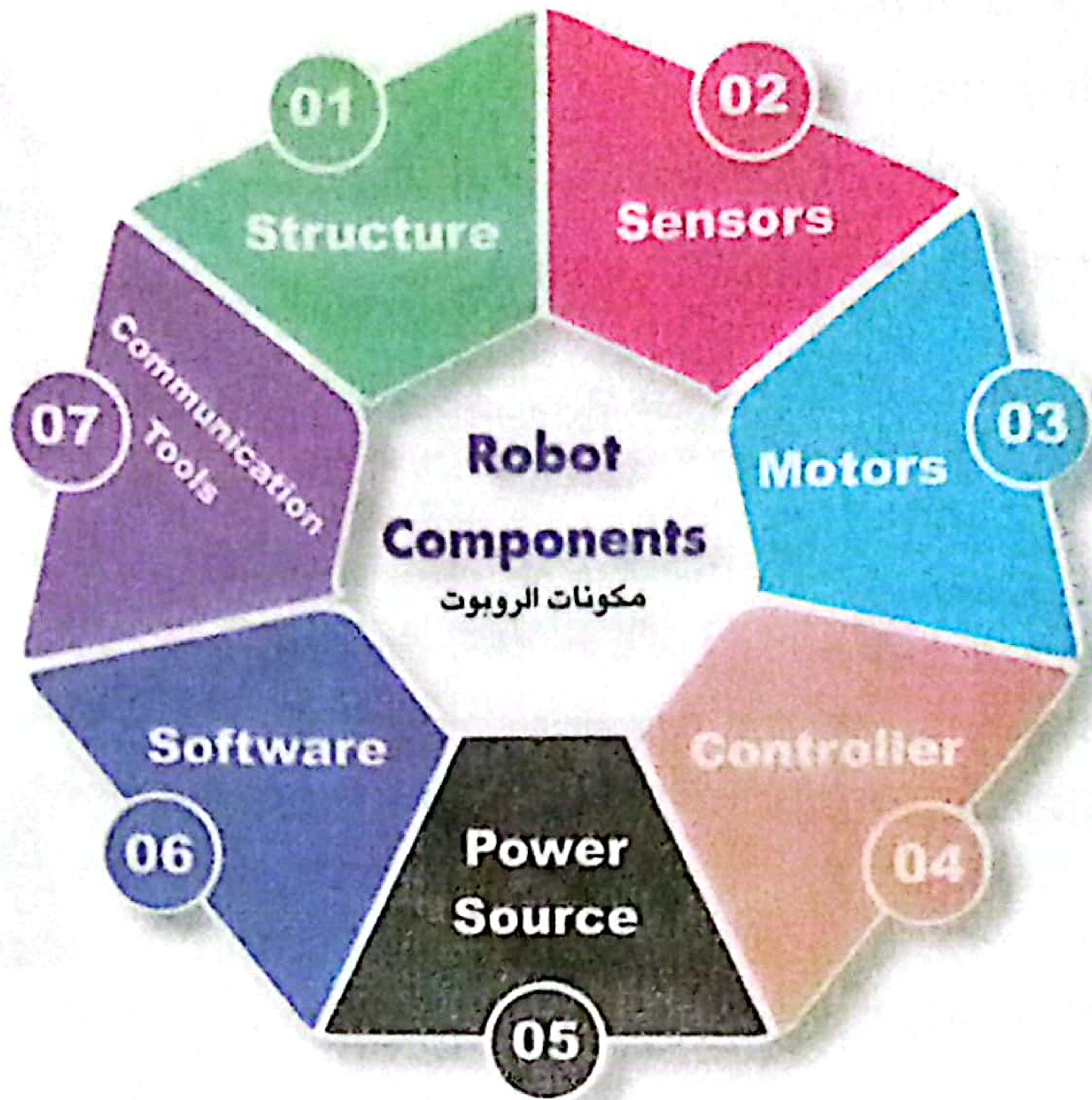


- These robots are used in schools to teach students programming and technology.
- **Examples:** LEGO Mindstorms robots that can be programmed to perform specific tasks to help students and teachers.

4 الروبوتات التعليمية:

• هذه الروبوتات تُستخدم في المدارس لتعليم الطلاب البرمجة والتكنولوجيا، مثل روبوتات LEGO Mindstorms التي يمكن برمجتها للقيام بمهام محددة؛ لمساعدة الطلاب ولتكون معينًا للمعلمين.

2- Robot Components مكونات الروبوت



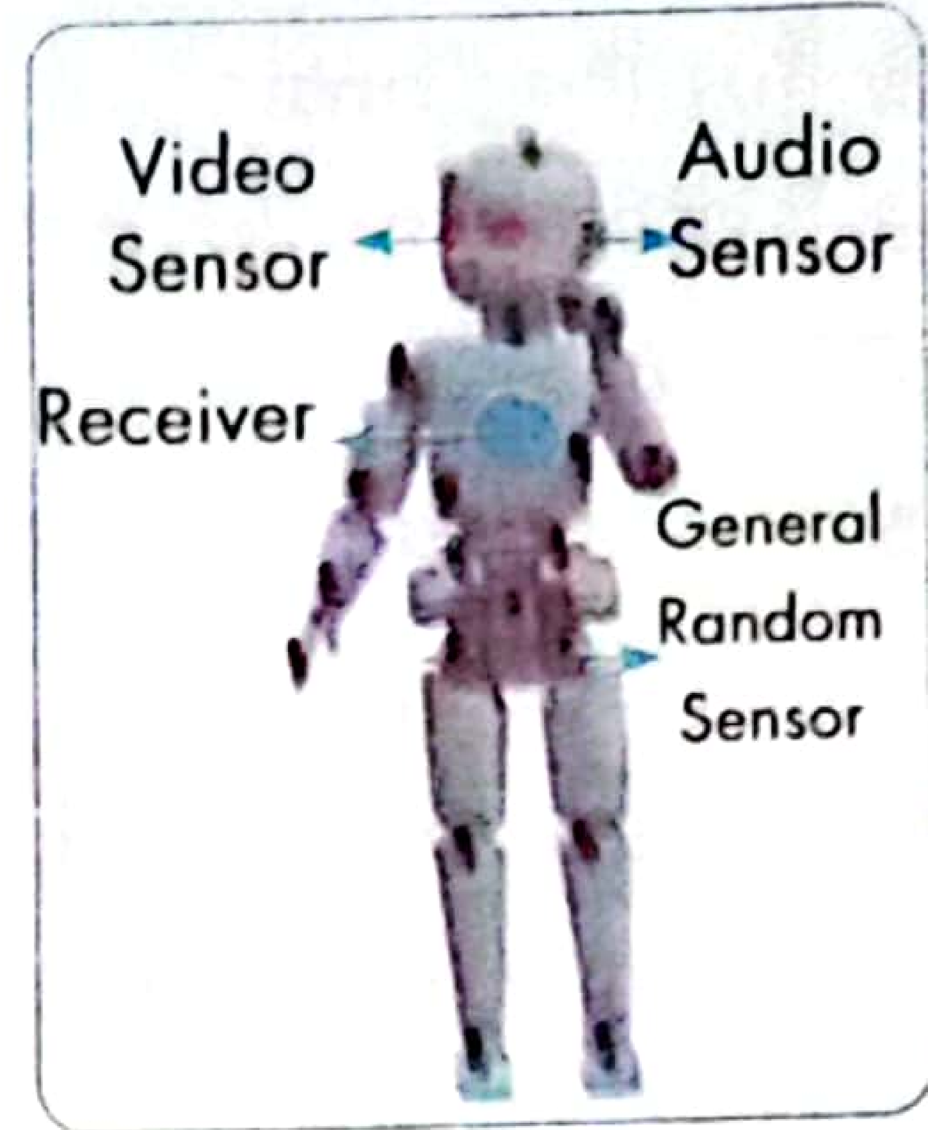
1 Structure:

- It is the main part that carries all the components of the robot.
- It can be made of different materials, such as metal, plastic, or carbon.
- The design of the structure affects the weight of the robot and its ability to move.

1 الهيكل:
- الهيكل هو الجزء الأساسي الذي يحمل جميع مكونات الروبوت.
- يمكن أن يكون مصنوعًا من مواد مختلفة مثل: المعدن، البلاستيك، الكربون.
- تصميم الهيكل يؤثر على وزن الروبوت وقدرته على الحركة.

2 Sensors:

- They are the senses of a robot.
- A robot uses sensors to pick up information from its surroundings, just as we use our eyes to see and our ears to hear.



Examples:

1. **Sound sensors:** pick up and analyze sounds.
2. **Cameras:** help robots "see" the things in front of them.

2 أجهزة الاستشعار:

- هي حواس الروبوت، يستخدمها الروبوت ليلتقط المعلومات من حوله تمامًا مثلما نستخدم عيوننا لنرى وآذاننا لنسمع.

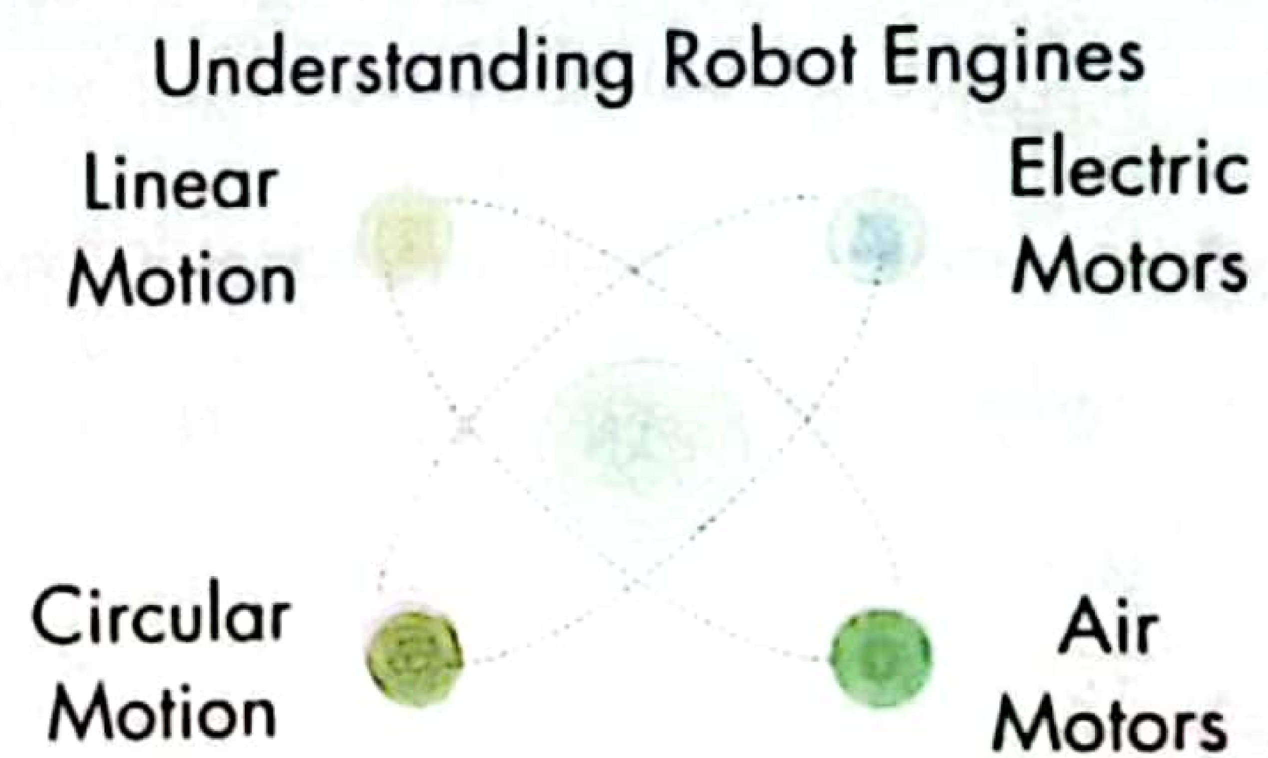
أمثلة:

1 مستشعرات الصوت: تلتقط الأصوات وتحللها.

2 الكاميرات: تساعد الروبوتات في «رؤية» الأشياء أمامها.

3 Motors:

- They are used to move parts of a robot.
- There are different types of motors, **such as:** electric motors and pneumatic motors, each with its own uses.
- Motors are the industrial muscles of robots.



- Robots can move and execute commands thanks to their motors (actuators).
- Robotic arms in factories move objects with precision.

3 المحركات:

- تستخدم المحركات لتحريك أجزاء الروبوت، هناك أنواع مختلفة من المحركات، مثل: المحركات الكهربائية والمحركات الهوائية، وكل منها له استخداماته الخاصة.
- تعتبر المحركات هي العضلات الصناعية للروبوتات، تستطيع الروبوتات التحرك وتنفيذ الأوامر بفضل محركاتها (مشغلاتها). تستخدم الأذرع الآلية في المصانع لتحريك الأشياء بدقة.

4 Controller:

- It is the "brain" of the robot
- It processes the data collected by the sensors and issues commands to the motors.
- A controller can be as simple as electronic circuits or as complex as microcomputers.
- The processor makes the decisions necessary to move the robot, just as our brain thinks when we decide to move.

4 وحدة التحكم:

- هي «عقل» الروبوت؛ حيث تعالج البيانات التي تجمعها المستشعرات، وتصدر الأوامر للمحركات.
- يمكن أن تكون وحدة التحكم بسيطة مثل الدوائر الإلكترونية، أو معقدة مثل الحواسيب الصغيرة.
- يقوم المعالج باتخاذ القرارات اللازمة لتحريك الروبوت، مثلما يفكر دماغنا عندما نقرر التحرك.

5 Power Source:

- Robots need a power source to operate.
- Power sources can be batteries, solar cells, or even direct electrical power sources.
- The choice of power source depends on the type of robot and the required operating time.

Energy Source for Robots

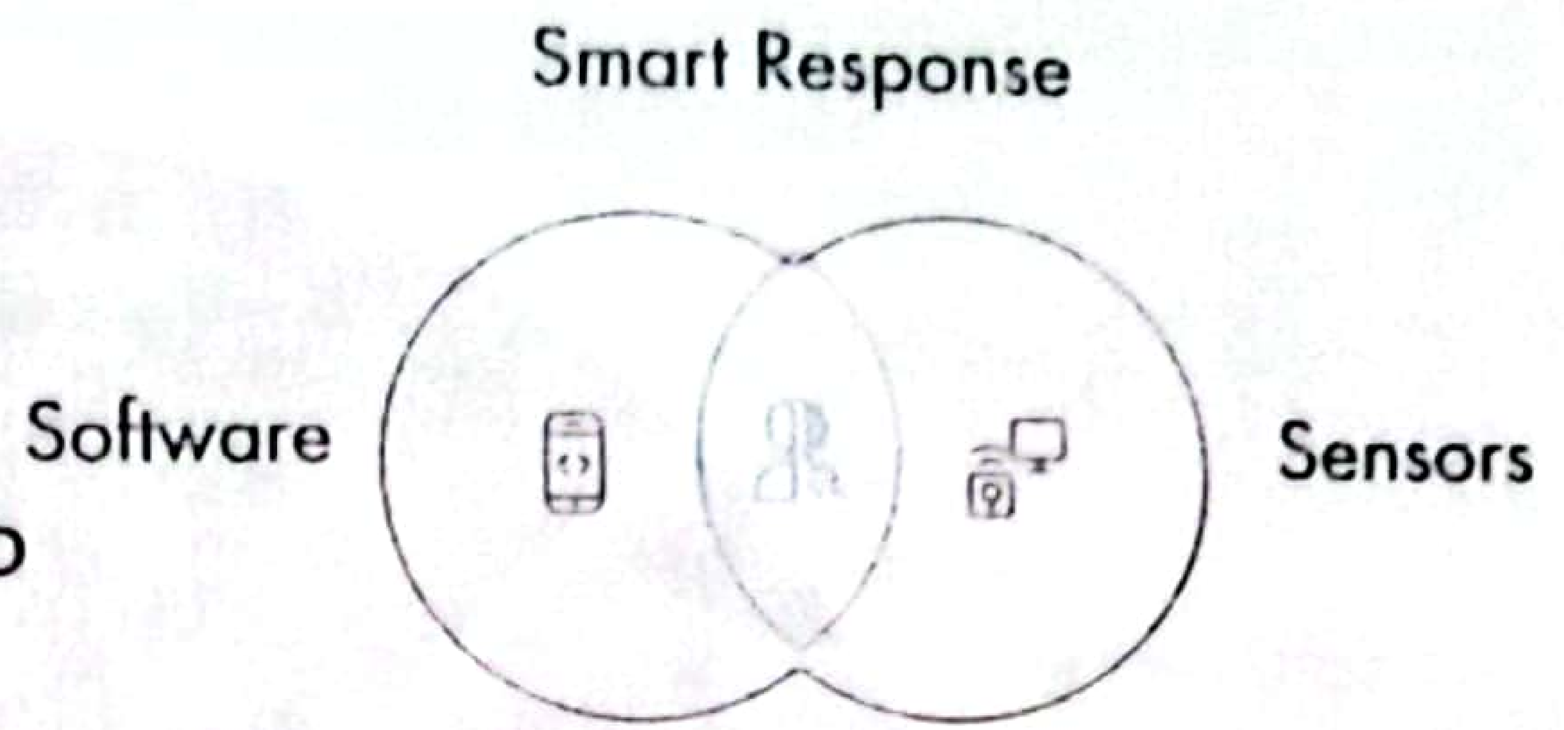


5 مصدر الطاقة:

- تحتاج الروبوتات إلى مصدر طاقة لتشغيلها. يمكن أن تكون مصادر الطاقة بطاريات، خلايا شمسية، أو حتى مصادر طاقة كهربائية مباشرة.
- اختيار مصدر الطاقة يعتمد على نوع الروبوت ومدة تشغيله المطلوبة.

6 Software:

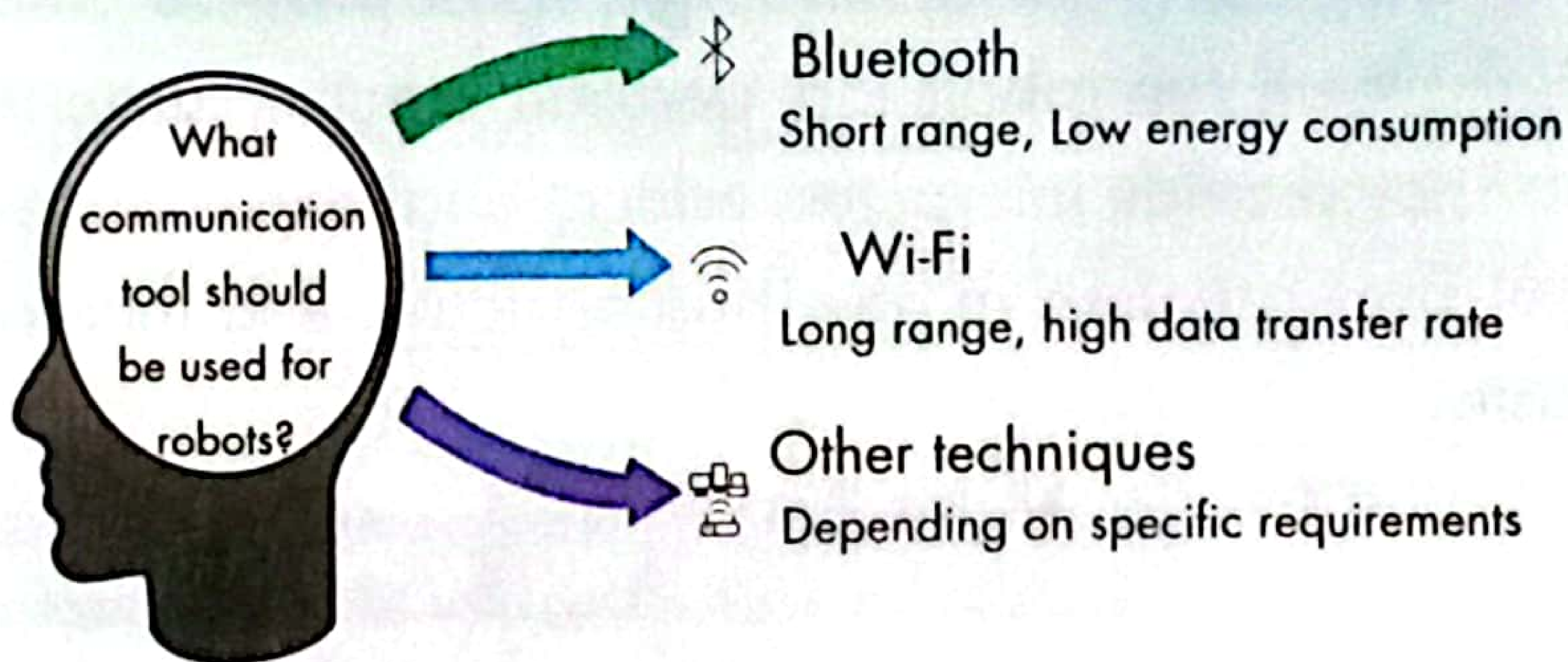
- Software is what makes a robot "smart."
- Software includes **algorithms** that determine how the robot responds to information it receives from sensors.
- Software can range from simple programs to complex artificial intelligence systems.



6 البرمجيات:

- هي التي تجعل الروبوت ذكيًا. تتضمَّن البرمجيات الخوارزميات التي تحدد كيفية استجابة الروبوت للمعلومات التي يتلقاها من المستشعرات.
- يمكن أن تتراوح البرمجيات من برامج بسيطة إلى أنظمة ذكاء اصطناعي معقدة.

7 Communication Tools:



- Robots use communication tools to interact with users or other robots.

Examples: Bluetooth and Wi-Fi

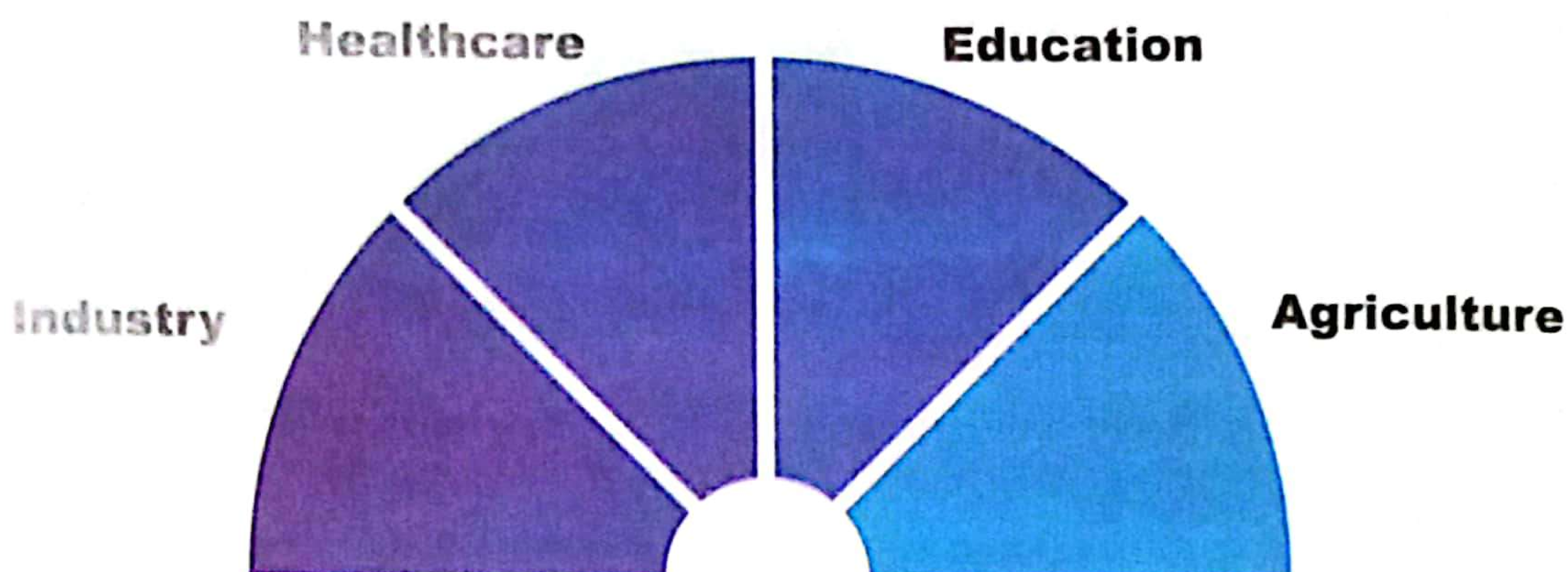
7 أدوات الاتصال:

- تستخدم الروبوتات أدوات الاتصال للتفاعل مع المستخدمين أو روبوتات أخرى، مثل: البلوتوث، والواي فاي.

NOTE:

- A home robot, such as a robot vacuum cleaner, has sensors to avoid collisions with furniture and room walls.
- الروبوت المنزلي -مثل مكنسة الروبوت- يحتوي على مستشعرات؛ لتجنب الاصطدام بالأثاث وجدران الغرف.

3- Areas of Use of Robots مجالات استخدام الروبوتات



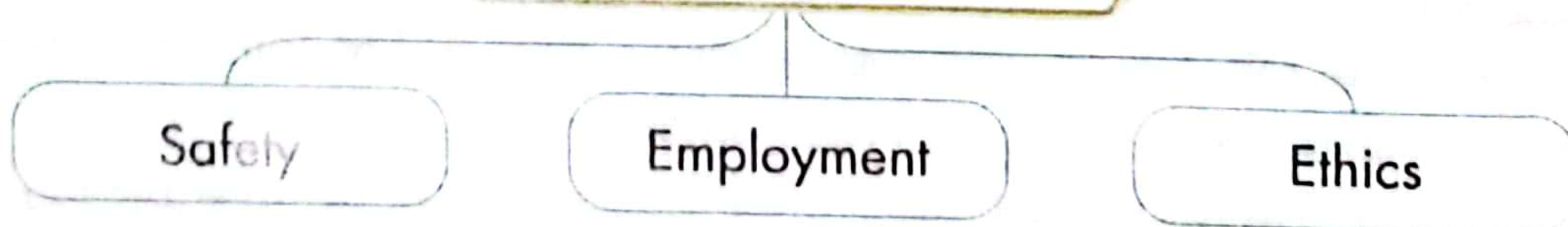
Robots have become part of our daily lives and are used in several fields, such as medicine, industry, and education.

1. **Industry:** They improve the productivity and reduce human errors.
   - In factories: robots help manufacture cars.
2. **Healthcare:** They assist doctors in surgeries or provide care for patients.
   - In hospitals: there are robots that perform precise surgeries.
3. **Education:** They provide interactive educational experiences for students.
4. **Agriculture:** They are used in precision agriculture to increase crops and reduce waste.

أصبحت الروبوتات جزءًا من حياتنا اليومية وتستخدم في عدة مجالات، مثل: الطب، الصناعة، التعليم.

1. **الصناعة:** تحسن الإنتاجية وتقلل الأخطاء البشرية.
   - في المصانع: تساعد الروبوتات في تصنيع السيارات.
2. **الرعاية الصحية:** تساعد الأطباء في العمليات الجراحية أو تقدم الرعاية للمرضى.
   - في المستشفيات: هناك روبوتات تقوم بإجراء جراحات دقيقة.
3. **التعليم:** توفر تجارب تعليمية تفاعلية للطلاب.
4. **الزراعة:** تستخدم في الزراعة الدقيقة لزيادة المحاصيل وتقليل النفايات.

4- Challenges التحديات



» Despite the many benefits of robotics, there are challenges facing this technology, such as:

1 **Safety:** The need to ensure the safety of robots during work.

2 **Employment:** Concerns that robots may replace human labor.

3 **Ethics:** Issues related to robots and their impact on society.

« رغم الفوائد العديدة للروبوتات، إلا أن هناك تحديات تواجه هذه التكنولوجيا، مثل:

1 **الأمان:** الحاجة إلى ضمان سلامة الروبوتات أثناء العمل.

2 **التوظيف:** القلق من أن الروبوتات قد تحل محل العمالة البشرية.

3 **الأخلاقيات:** القضايا المتعلقة بالروبوتات وتأثيرها على المجتمع.

5- Benefits of Robots فوائد الروبوتات

» Robots offer many benefits in various fields, as they help improve work efficiency, reduce errors, and save time.

» The most prominent benefits of robots are:

« تقدم الروبوتات العديد من الفوائد في مجالات متعددة؛ إذ تساعد في تحسين كفاءة العمل وتقليل الأخطاء وتوفير الوقت. ومن أبرز فوائد الروبوتات:

1 Increased efficiency and productivity:

» Industrial robots can work continuously without fatigue or interruption, which increases the amount of production in factories and saves time.

» In production lines, robots can perform repetitive tasks accurately and without any delay, which improves the quality of products and reduces errors.

1 **زيادة الكفاءة والإنتاجية:**

- الروبوتات الصناعية يمكنها العمل بشكل مستمر دون تعب أو انقطاع؛ مما يزيد من كمية الإنتاج في المصانع ويوفر الوقت.
- في خطوط الإنتاج، تستطيع الروبوتات أداء المهام المتكررة بدقة وبدون أي تأخير؛ مما يحسن جودة المنتجات ويقلل الأخطاء.

2 High accuracy and reduced errors:

- Medical robots are used in complex surgeries, helping doctors achieve greater accuracy and reduce the chances of human error.
- In the electronics industry, robots assemble small parts with precision, improving manufacturing accuracy and reducing losses due to defects.

2 الدقة العالية وتقليل الأخطاء:

- تستخدم الروبوتات الطبية في العمليات الجراحية المعقدة؛ حيث تساعد الأطباء على تحقيق دقة أكبر وتقليل احتمالات حدوث أخطاء بشرية.
- في صناعة الإلكترونيات، تعمل الروبوتات على تركيب الأجزاء الصغيرة بحرفية؛ مما يحسن دقة التصنيع ويقلل الخسائر الناتجة عن العيوب.

3 Safety and security:

- Robots help in dangerous tasks, such as dismantling bombs, or working in hazardous environments, which reduces the risk to human lives and makes these tasks safer.
- In factories, robots can handle heavy weights and hazardous chemicals, reducing the chances of worker injury.

3 السلامة والأمان:

- تساعد الروبوتات في المهام الخطرة، مثل: تفكيك القنابل أو العمل في بيئات خطرة، وهذا يقلل من تعريض حياة البشر للخطر، ويجعل هذه المهام أكثر أمانًا.
- في المصانع، يمكن للروبوتات التعامل مع الأوزان الثقيلة والمواد الكيميائية الخطرة؛ مما يقلل من احتمالات إصابة العمال.

4 Adaptability to diverse work:

- Robots can be programmed to perform various tasks as needed, making them capable of performing different jobs efficiently. For example, home robots can clean or entertain.
- In the field of education, robots help students learn programming and science in interactive ways to help students and teachers.

4 التكيُّف مع العمل المتنوع:

- يمكن برمجة الروبوتات لتنفيذ مهام متنوعة حسب الحاجة؛ مما يجعلها قادرة على أداء أعمال مختلفة بكفاءة. على سبيل المثال، الروبوتات المنزلية يمكنها القيام بالتنظيف أو الترفيه.
- في مجال التعليم، تساعد الروبوتات الطلاب على تعلم البرمجة والعلوم بطرق تفاعلية؛ لمساعدة الطلاب والمعلمين.

5 Reducing costs in the long run:

- Although the cost of manufacturing and installing robots may be high, robots reduce costs in the long run by reducing the need for human labor, achieving greater accuracy, and reducing errors and waste.

5 تقليل التكلفة على المدى الطويل:

- على الرغم من أن تكلفة تصنيع وتركيب الروبوتات قد تكون مرتفعة، فإن الروبوتات تقلل التكاليف على المدى الطويل؛ من خلال تقليل الحاجة إلى العمالة البشرية، وتحقيق دقة أكبر، وتقليل نسبة الأخطاء والهدر.

6 Contributing to development:

- Robots encourage technological development and open new horizons in many fields, such as space, where robots are used to explore planets.
- In the field of medicine, robots contribute to advanced medical research and the development of new treatments.

6 المساهمة في التطوير:

- تشجع الروبوتات على التطوير التكنولوجي وفتح آفاق جديدة في مجالات عديدة مثل الفضاء؛ حيث تستخدم الروبوتات في استكشاف الكواكب.
- في مجال الطب، تساهم الروبوتات في الأبحاث الطبية المتقدمة وتطوير علاجات جديدة.

أهم الكلمات والمصطلحات

Hazardous	خطرة	Motors	محركات
Functions	وظائف	Controller	المتحكم
Daily tasks	المهام اليومية	Power source	مصدر الطاقة
Programmed	مبرمج	Actuators	المحركات
Sensors	أجهزة استشعار	Communication tools	أدوات التواصل
Electronic circuits	دوائر إلكترونية	Healthcare	الرعاية الصحية
Precision	الدقة	Challenges	تحديات
Accuracy	صحيح	Dismantling	تفكيك
Industrial robots	روبوتات صناعية	Human labor	العمالة البشرية
Home robots	روبوتات منزلية	Efficiency	الكفاءة
Medical robots	روبوتات طبية	Productivity	الإنتاجية
Educational robots	روبوتات تعليمية	Adaptability	التكيف
Structure	هيكل	Long run	على المدى البعيد
Exploratory robots	روبوتات استكشافية	Development	التطور



Exercises on Lesson 3

1 Choose the correct answer:

1. The challenges facing robotics technology include ....
   a. the increased reliance on paper documents
   b. the increased reliance on smartphones
   c. safety, employment, and ethics
   d. the increased reliance on traditional machines

2. In production lines, robots can perform repetitive tasks accurately and without any delay, which leads to ....
   a. an increased efficiency and productivity
   b. a decreased efficiency and productivity
   c. a lack of product development
   d. a slow production process

3. Robots help in dangerous tasks, such as ....
   a. transportation
   b. handling heavy weights and hazardous chemicals
   c. irrigating gardens and parks
   d. cleaning the house

4. To take pictures and videos, we use .... sensors.
   a. sound
   b. touch
   c. light
   d. vision

5. A robot is a device that can be programmed to perform tasks ....
   a. manually
   b. automatically
   c. randomly
   d. none of them

6. Robots can move, sense, and interact with their surroundings using ....
   a. sensors
   b. motors
   c. controllers
   d. all of them

7. .... is an example of a home robot.
   a. An industrial robot
   b. A medical robot
   c. Roomba
   d. An educational robot

8 The main part that carries all components of a robot is the ....
a. sensors b. motors c. structure d. controller

9 .... is/are considered the "brain" of the robot.
a. Sensors b. Motors c. The structure d. The controller

10 A power source for robots is the ....
a. sensors b. motors c. batteries d. software

11 .... is a type of motor used in robots.
a. Electric motor
b. Solar motor
c. Hydraulic motor
d. Wind motor

12 Robots use .... to interact with users or other robots.
a. sensors
b. communication tools
c. motors
d. a power source

13 .... make(s) the robot smart, including algorithms to respond to information.
a. A controller b. Software c. Motors d. Sensors

14 A benefit of using robots in industry is ....
a. increasing human errors
b. reducing productivity
c. improving accuracy
d. high costs

15 Medical robots are known for their ....
a. entertainment b. accuracy c. speed d. cleaning

16 An example of a communication tool used by robots is ....
a. sensors b. Wi-Fi c. Bluetooth d. both b and c

17 An example of educational robots is ....
a. Roomba
b. LEGO Mindstorms
c. Zoomba
d. all of them

2 Put (✓) or (✗):

1 Robots can improve productivity and reduce human errors in industry. ( )

2 📖 Sensors do not play a role in the movement of robots and sensing their surrounding environment. ( )

3 Home robots, like Roomba, help clean floors without human effort. ( )

4 Robots' work is limited to factories only. ( )

5 The structure of a robot can be made of metal, plastic, or carbon. ( )

6 Medical robots help doctors perform surgeries. ( )

7 The controller of a robot acts as its "brain," processing data and issuing commands. ( )

8 The design of the structure affects the weight of the robot and its ability to move. ( )

9 Vision sensors are used to capture sounds. ( )

10 The motors used in robots include electric motors and air motors. ( )

11 The control unit processes the data collected by the sensors and issues commands to the motors. ( )

12 Robots rely on direct energy sources only and we cannot use batteries or solar cells. ( )

13 Robots do not need to use software in their work. ( )

14 Robots use communication tools to interact with users or other robots. ( )

15 The areas of use of robots include industry, healthcare, and education. ( )

16 Software is responsible for making a robot "smart" by determining its responses to sensor information. ( )

3 Match:

Column (A)	Column (B)
1 Industrial robots	a. are used in the living room.
2 Home robots	b. are used in factories.
3 Medical robots	c. are used in hospitals.
4 Educational robots	d. are used in classrooms.

1 .... 2 .... 3 .... 4 ....

4 Fill in the blanks:

1 The .... is the "brain" of the robot, processing data from sensors.

2 Robots use .... to move their parts, such as robotic arms.

3 Robots use .... to collect information from their surroundings, such as sound sensors and cameras.

4 The .... is the main part of the robot that carries all its components and can be made of materials like metal or plastic.

5 .... are used in robots to move parts, such as robotic arms or wheels.

5 Arrange the following robot components in the order they interact when the robot performs a task:

1 The sensors detect information.

2 The controller processes data.

3 Motors execute commands.

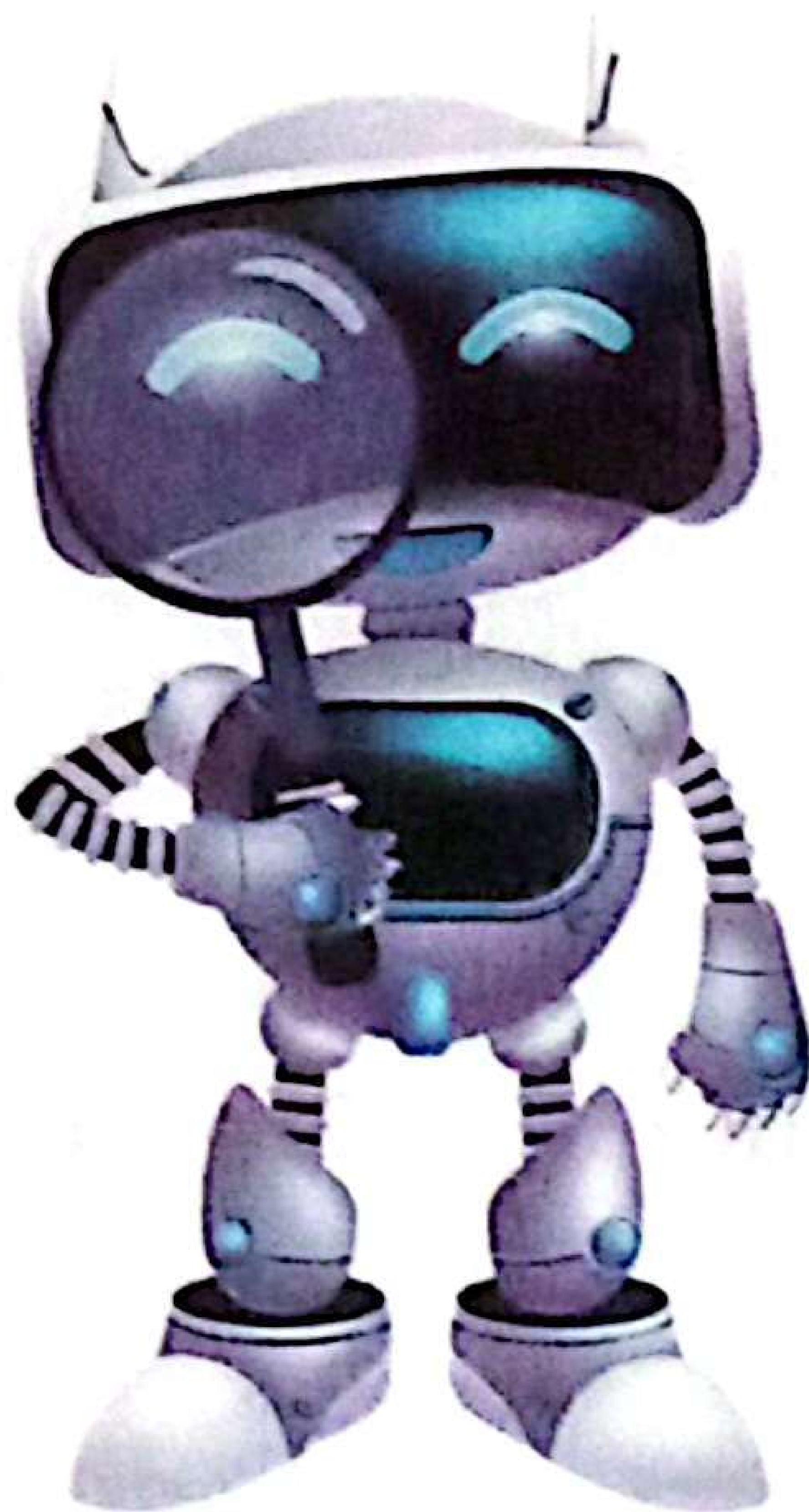
4 The power source supplies energy.

Play with PONY

Word Search

Find the following words in the puzzle and complete:

(educational – algorithms – sensors – medical – Bluetooth – actuators – brain – structure – automatically – power source)



f	e	i	a	d	e	e	y	g	b	t	b	r	a	i	n	p	a
s	y	r	f	c	a	p	d	l	q	l	y	u	v	a	a	h	u
h	e	m	u	a	t	l	k	u	b	d	u	w	j	b	s	p	f
x	s	n	e	n	h	u	g	d	c	y	f	e	v	s	p	d	v
f	z	o	s	d	d	a	a	o	k	a	e	m	t	r	w	v	h
e	r	v	r	o	i	k	j	t	r	h	t	v	q	o	q	r	f
u	j	d	s	t	r	c	b	g	o	i	e	i	t	k	o	z	m
j	i	l	f	p	v	s	a	a	j	r	t	c	o	f	z	t	c
v	m	i	s	f	e	a	w	l	w	m	s	h	p	n	l	b	h
p	o	w	e	r	s	o	u	r	c	e	a	l	m	a	a	c	f
m	a	u	t	o	m	a	t	i	c	a	l	l	y	s	a	l	g
m	k	k	k	s	t	r	u	c	t	u	r	e	k	t	m	o	g

1 A robot is a device that can be programmed to perform a set of specific tasks ....

2 .... robots help doctors perform surgeries.

3 An example of .... robots is LEGO Mindstorms robots.

4 The design of the .... affects the weight of the robot and its ability to move.

5 The robot uses .... to pick up information from its surroundings.

6 .... are the industrial muscles of a robot.

7 The controller is the ".............................." of a robot .

8 The choice of .... depends on the type of robot and the required operating time.

9 Software includes .... that determine how the robot responds to the information it receives from sensors.

10 Communication tools can include ...., Wi-Fi, or other communication technologies.

Lesson 4

Scratch

The Scratch program provides a very wide range of programming ideas, including:

Games | Animations | Comics | Music | Simulations | Interactive games for AI

• يوفر برنامج Scratch خيارات واسعة جدًا من أفكار البرمجة، بما في ذلك الألعاب والرسوم المتحركة والقصص المصورة والموسيقى والمحاكاة والألعاب التفاعلية للذكاء الاصطناعي.

Benefits of Scratch Program فوائد برنامج سكراتش

- Scratch allows students to be creative while learning.
- Students feel like playing a fun game while learning.
- It is a fun and easy-to-use educational tool.
- It allows learning the basics of programming in a visual and enjoyable way without writing complex codes.



• يسمح برنامج سكراتش للطلاب بأن يكونوا مبدعين أثناء التعلم؛ ليشعر الطلاب وكأنهم يلعبون لعبة ممتعة أثناء تعلمهم.
• أداة تعليمية ممتعة وسهلة الاستخدام تتيح تعلم أساسيات البرمجة بطريقة مرئية وممتعة دون كتابة أكواد معقدة.

Features of Scratch Program مميزات برنامج سكراتش

1 Simple Interface:

- Scratch uses a visual interface based on **blocks** (bricks or commands).
- Blocks are placed on top of each other in a specific system and order to form programs.

1 واجهة بسيطة:
• يستخدم سكراتش واجهة مرئية تعتمد على (اللبنات أو الأوامر) Blocks، والتي توضع فوق بعضها في نظام وترتيب معين لتكوين البرامج.

2 Educational Program:

» Scratch is designed to teach basic programming concepts in a fun and exciting way.

2 برنامج تعليمي:

• تم تصميم سكراتش لتعليم مفاهيم البرمجة الأساسية بطريقة ممتعة ومشوقة.

3 Free Program:

» Scratch can be downloaded from its official website and used for free.

3 برنامج مجاني:

• يمكن تنزيل سكراتش من موقعه الرسمي واستخدامه مجانًا.

4 Developing Creative Thinking:

» Scratch helps learners develop their skills in creative thinking and problem-solving.

4 تنمية التفكير الإبداعي:

• يساعد سكراتش المتعلمين على تطوير مهاراتهم في التفكير الإبداعي وحل المشكلات.

5 Enhancing Problem-Solving Skills:

» By trying mistakes and learning from them, students learn how to solve problems logically.

5 تعزيز مهارات حل المشكلات:

• من خلال تجربة الأخطاء والتعلم منها، يتعلم الطلاب كيفية حل المشكلات بطريقة منطقية.

6 Developing Collaboration Skills:

» Students can work together on Scratch projects, which enhances teamwork skills.

6 تنمية مهارات التعاون:

• يمكن للطلاب العمل معًا في مشاريع سكراتش؛ مما يعزز مهارات العمل الجماعي.

7 An Exciting Start to the World of Programming:

- Scratch provides a strong foundation for moving on to more difficult programming languages in the future.

7 بداية مشوقة لعالم البرمجة:

• يوفر سكراتش أساسًا قويًا للانتقال إلى لغات برمجة أكثر صعوبة في المستقبل.

8 Sharing the Project:

- Projects can be shared with others.

8 مشاركة المشروع:

• يمكن مشاركة المشاريع مع الآخرين.

Getting Started with Scratch
البدء في استخدام برنامج سكراتش

1 Download Scratch:

- Scratch can be downloaded for free from its official website: https://scratch.mit.edu
- Download link: https://scratch.mit.edu/download

2 Explore:

- Explore the interface and learn how the different blocks and commands work.

3 Create a Project:

- Start by creating a simple project, such as:

1. Animating a character
2. Creating a short story

4 Save the Project.

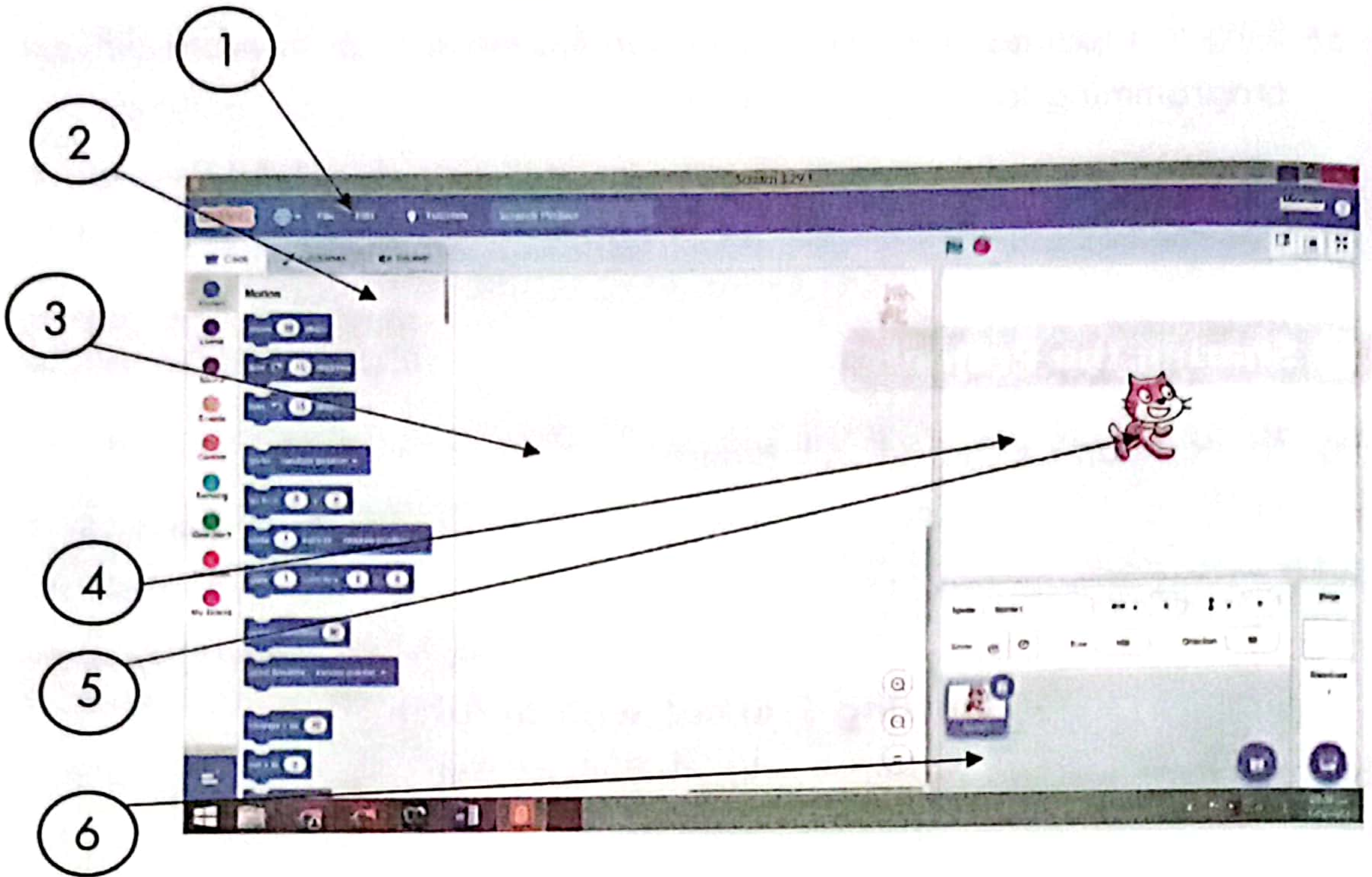
1 **تحميل برنامج سكراتش:** يمكن تحميل برنامج سكراتش مجانًا من موقعه الرسمي.

2 **الاستكشاف:** استكشف الواجهة وتعرف على كيفية عمل blocks والأوامر المختلفة.

3 **إنشاء مشروع:** ابدأ بإنشاء مشروع بسيط، مثل: تحريك شخصية أو إنشاء قصة قصيرة.

4 **احفظ المشروع.**

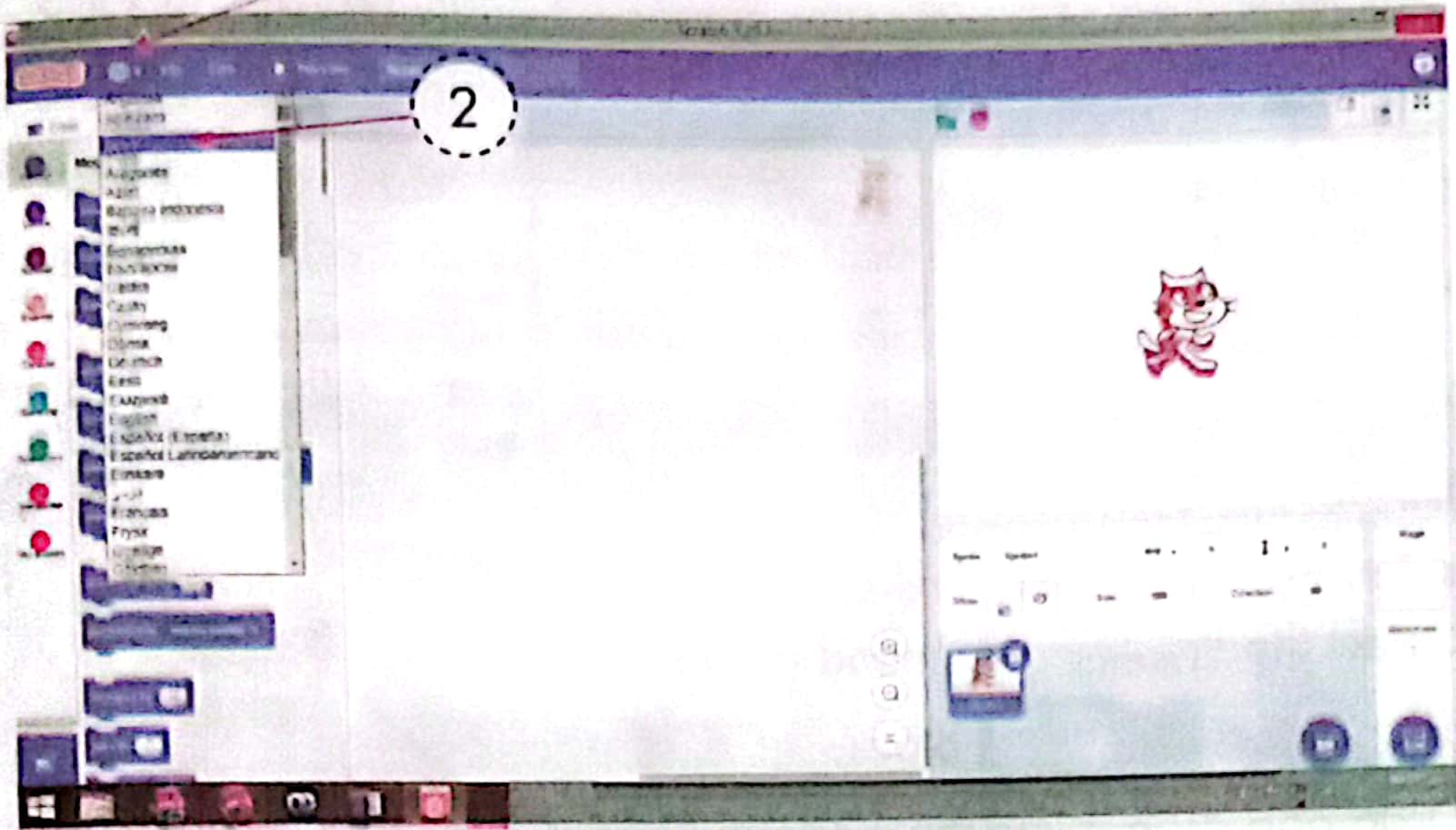
The Program Interface واجهة البرنامج



1 Menu Bar
2 Command Blocks Area
3 Script Area: It collects programming sections by composing a group of graphical commands, called blocks, in a specific order.
4 Stage Area: It shows the result of the work or project.
5 Sprite Object
6 Sprites Area: It contains the objects used in the project.

1 شريط القوائم.
2 منطقة مجموعات الأوامر Blocks Area.
3 منطقة البرمجة Script Area: تجمع المقاطع البرمجية عن طريق تركيب مجموعة من الأوامر الرسومية تُسمى blocks بترتيب معين.
4 منطقة المنصة أو المسرح Stage Area: تعرض نتيجة العمل أو المشروع.
5 الكائن Sprite.
6 منطقة الكائنات Sprites Area: تحتوي على الكائنات المستخدمة في المشروع.

Changing the Language of the Program Interface



Project 1

- Move the sprite (cat) on the platform or stage "30 steps".
- Then the phrase "Good Morning!" appears.

حرِّك الكائن (القط) على المسرح "stage" 30 خطوة، ثم تظهر العبارة "!Good Morning".

Implement the Project:

A Moving the sprite (cat) on the stage:

1 From the command blocks area, "Motion" blocks group

2 Drag and drop the move 10 steps block into the Script Area.

3 To set the object's movement to 30 steps, double-click the value 10 in the command block and write the value 30.

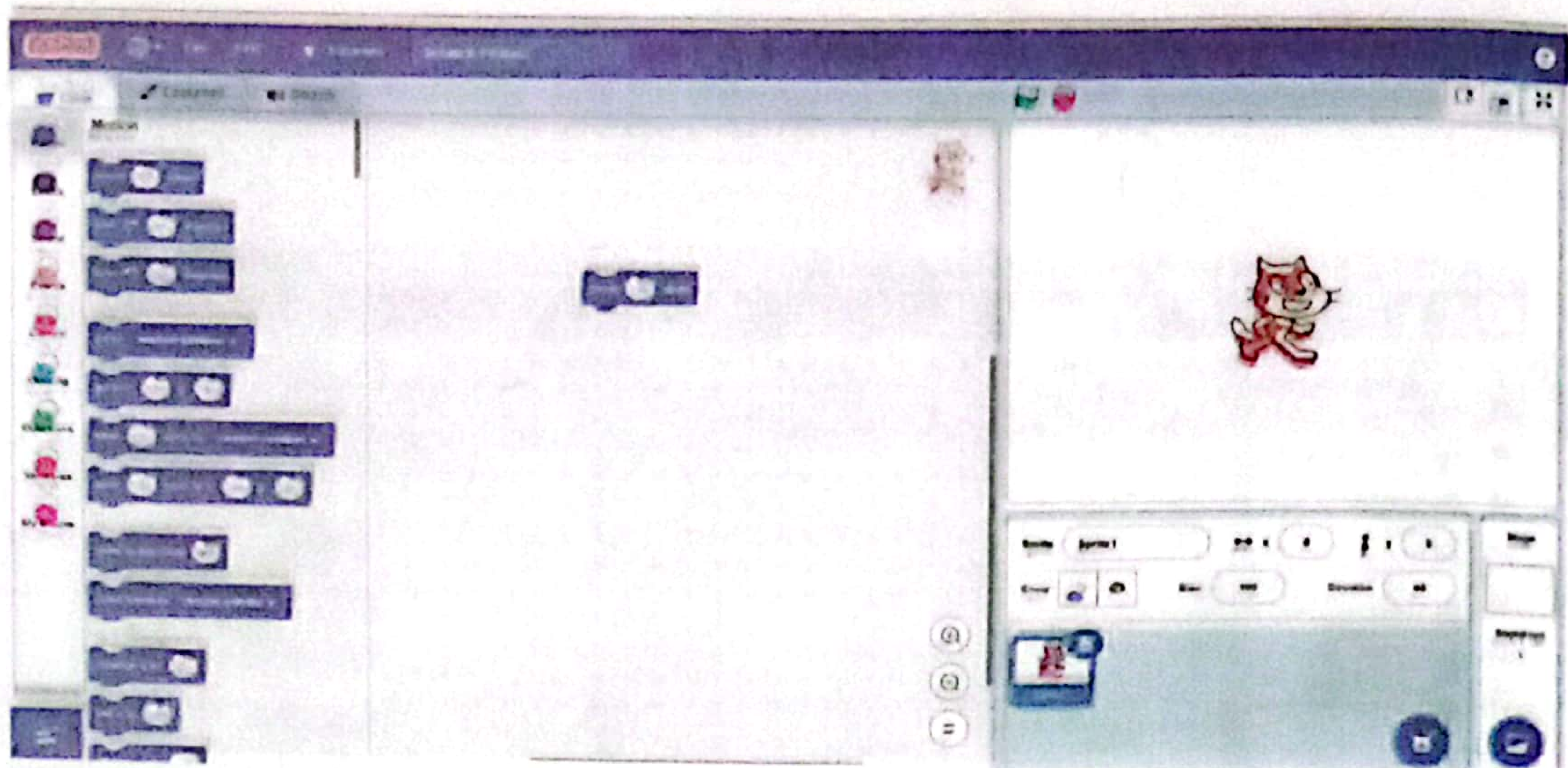
تنفيذ المشروع:

أولًا: تحريك الكائن (القط) على المسرح:

1 من منطقة blocks area، مجموعة «الحركة».

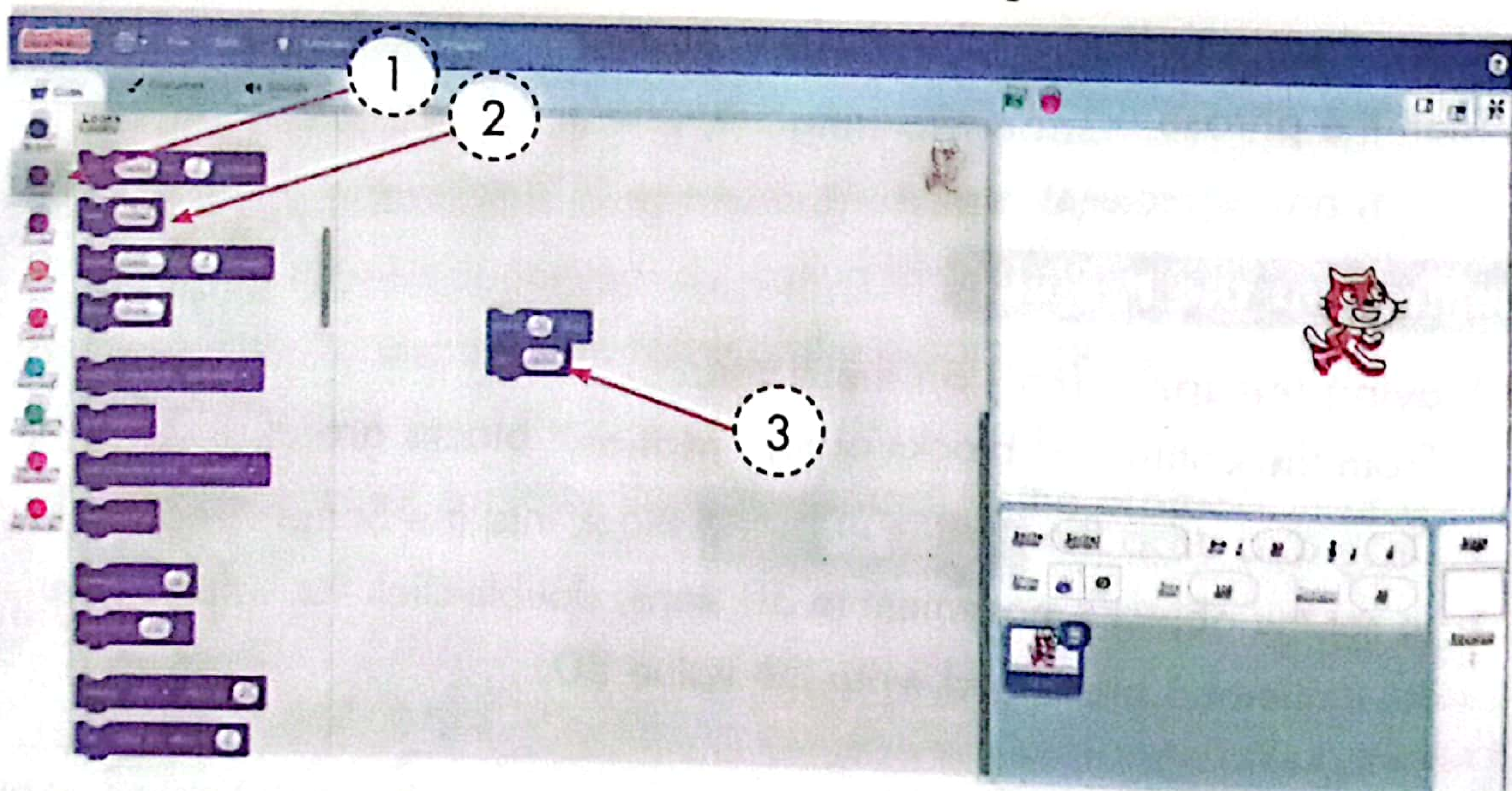
2 قم بسحب وإلقاء move 10 steps في منطقة البرمجة Script Area.

3 لجعل خطوات حركة الكائن 30 خطوة، انقر نقرًا مزدوجًا فوق القيمة 10 في كتلة الأوامر واكتب القيمة 30.



B Displaying the phrase "Hello!":

1. Select the "**Looks**" command group.
2. Then select say Hello! block.
3. Drag and drop it into the platform "**Script Area**" below the previous command.
4. Click on "**Hello**", then write "**Good Morning**"



ثانيًا: عرض عبارة «مرحبًا!»:

1 قم باختيار مجموعة الأوامر "Looks".

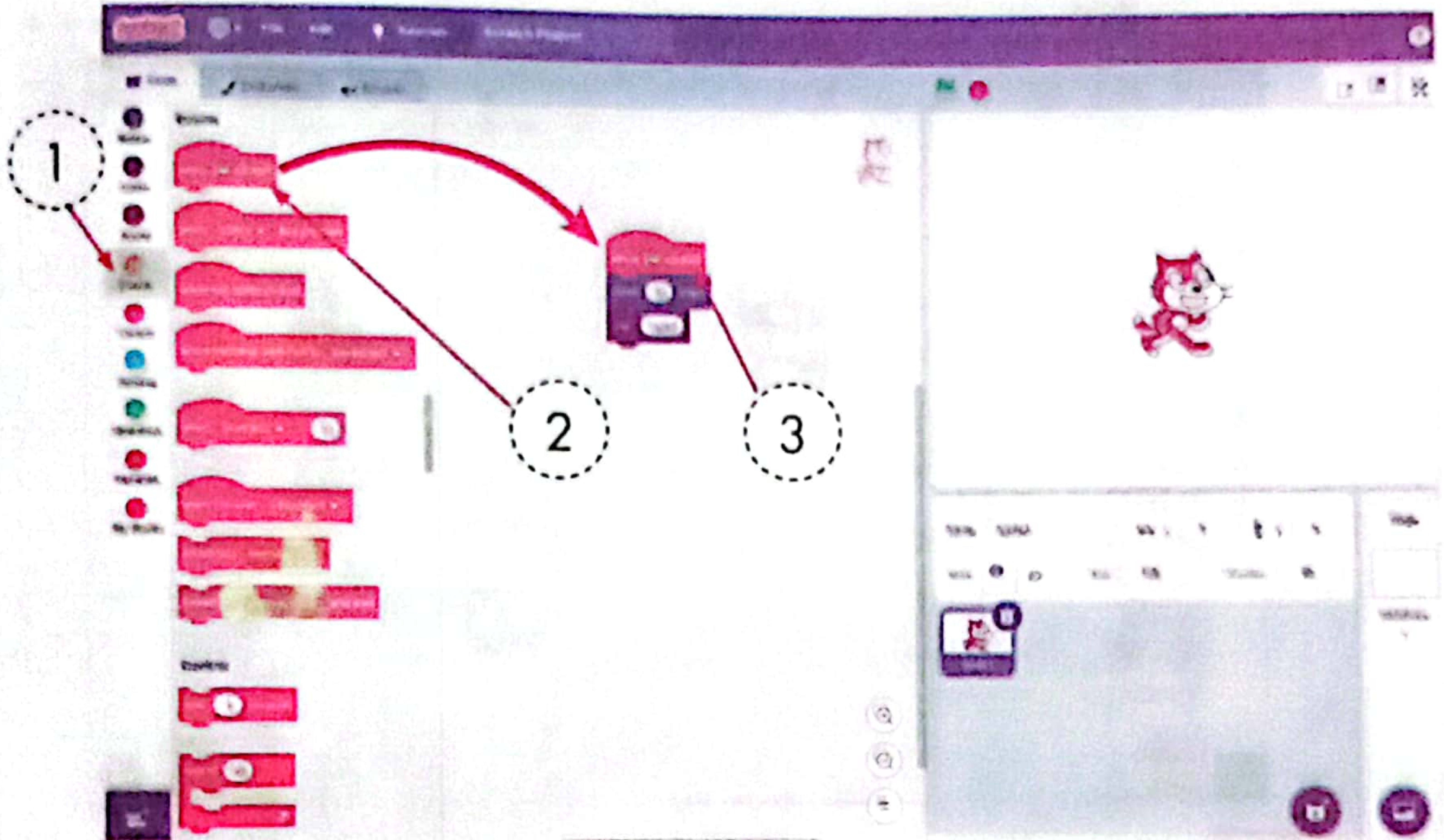
2 ثم اختر الأمر 

3 قم بسحبها وإفلاتها في «منطقة Script Area» أسفل الأمر السابق.

4 قم بالنقر على "Hello" ثم اكتب "Good Morning".

C To view the implementation of the project steps:

1. In the Script Area, click on **"Events"** Blocks group.
2. Click on the command when clicked and drag it to the platform.
3. Install it at the beginning of the programming section as shown in the figure.
4. To execute the project, click on the icon .
5. To stop the execution of the project, click on the icon .



ثالثًا: لمشاهدة تنفيذ خطوات المشروع:

1 في منطقة البرمجة Script، انقر على مجموعة Event blocks.

2 انقر على الأمر when clicked واسحبه إلى المنصة.

3 قم بتثبيته في بداية المقطع البرمجي كما هو موضح في الشكل.

4 لتنفيذ المشروع، انقر على الرمز

5 لإيقاف تنفيذ المشروع، انقر على الرمز

Note: In the previous project, we saw that the movement was done quickly.

Solution: Use the Wait command from **"Control"** blocks by following these steps:

1 Click on "Control" blocks.

2 Drag and drop the command wait 1 seconds into the Script Area.

3 Place it as shown below.

4 To re-execute the project, click on the icon .

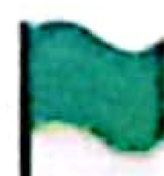
• ملاحظة: في المشروع السابق لاحظنا أن الحركة تمت بطريقة سريعة.

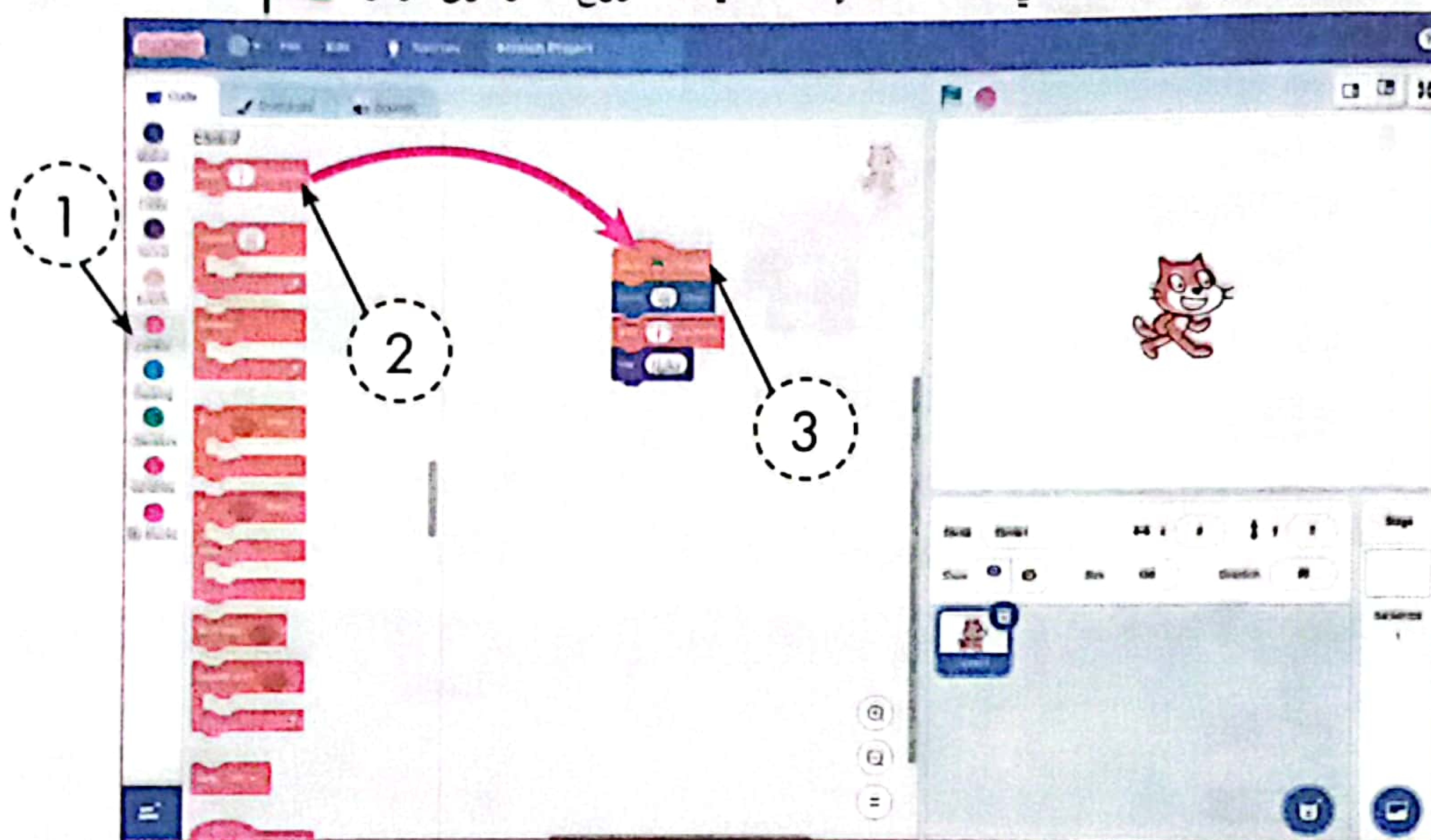
• الحل: استخدم أمر الانتظار Wait من Control blocks باتباع الخطوات التالية:

1 انقر فوق Control blocks.

2 قم بسحب وإفلات الأمر wait 1 seconds في منطقة البرنامج النصي.

3 ضعه كما هو موضح بالشكل التالي.

4 لإعادة تنفيذ المشروع، انقر فوق الرمز 



NOTES:

1 The wait value represents 1 second.

2 Installing a set of commands in a specific order is called a **code section**.

3 Use click, drag, and drop to deal with any command within the code section.

4 To make the movement continuous, you can install the command several times.

5 Re-arrange it by clicking and dragging to the place where you want to start the repetition.

6 Before implementing the project, the value of the object's coordinates on the platform is:

- X = 0, which is the horizontal axis and represents horizontal movement.
- Y = 0, which is the vertical axis and represents vertical movement.

7 You can control the sprite's position on the platform by clicking, dragging, and dropping it to another place on the platform.

ملاحظات:

1 قيمة الانتظار تمثل ثانية واحدة. 2 تثبيت مجموعة من الأوامر بترتيب معين يُسمى المقطع البرمجي.

3 استخدم النقر والسحب والإفلات للتعامل مع أي أمر داخل المقطع البرمجي.

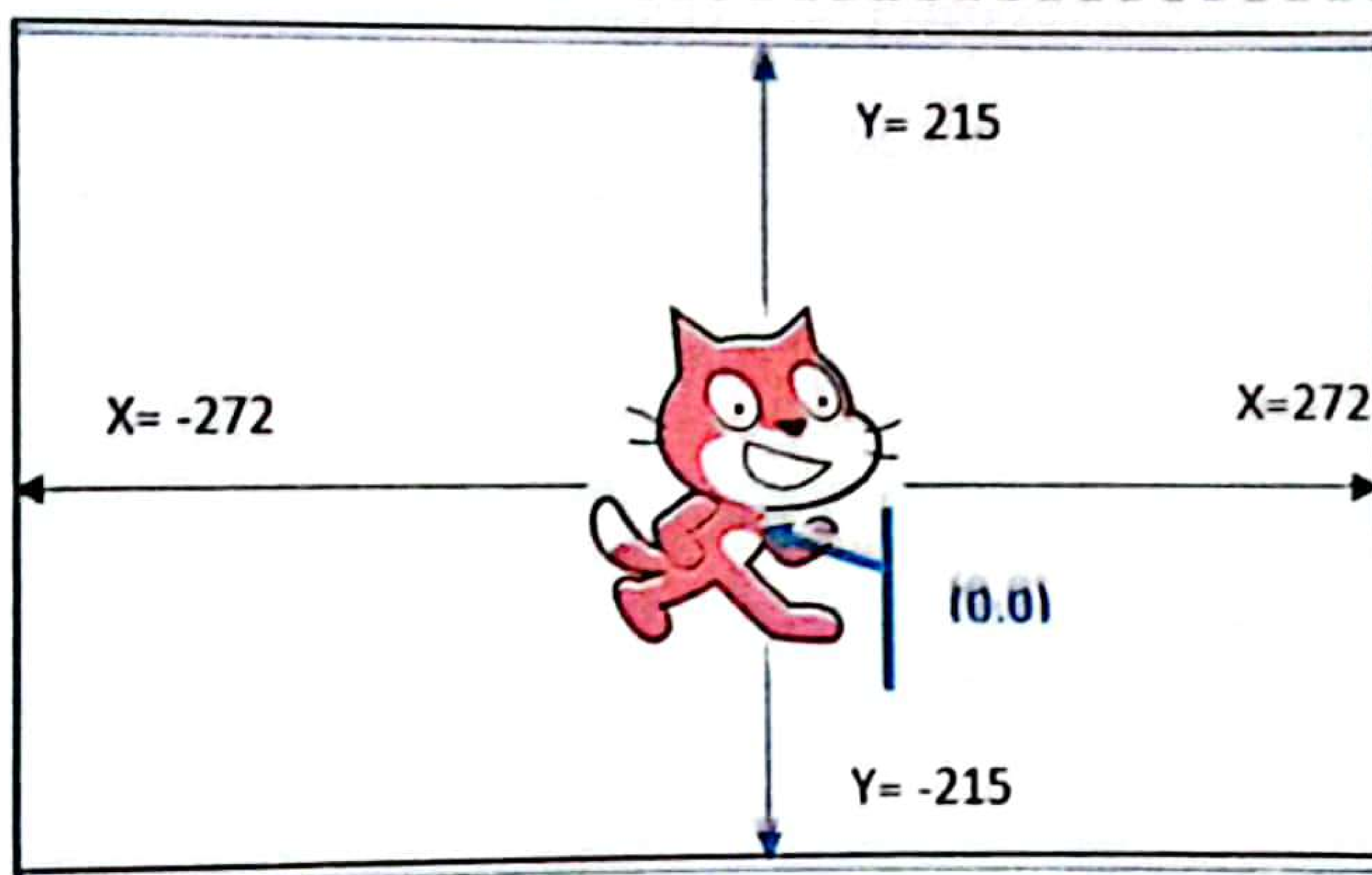
4 لجعل الحركة مستمرة، يمكنك تثبيت الأمر عدة مرات.

5 أعد ترتيبه بالنقر والسحب إلى المكان الذي تريد بدء التكرار فيه.

6 قبل تنفيذ المشروع، تكون قيمة إحداثيات الكائن على المنصة:

- X=0 وهو المحور الأفقي ويمثل الحركة الأفقية.
- Y=0 وهو المحور الرأسي ويمثل الحركة الرأسية.

7 يمكنك التحكم في موضع sprite على المنصة بالنقر فوقه وسحبه وإفلاته إلى مكان آخر على المنصة.



Save the Project in a File

To save your project, do the following:

1 From the File menu, choose Save to your computer.

2 Select a location to save the file on one of the storage media.

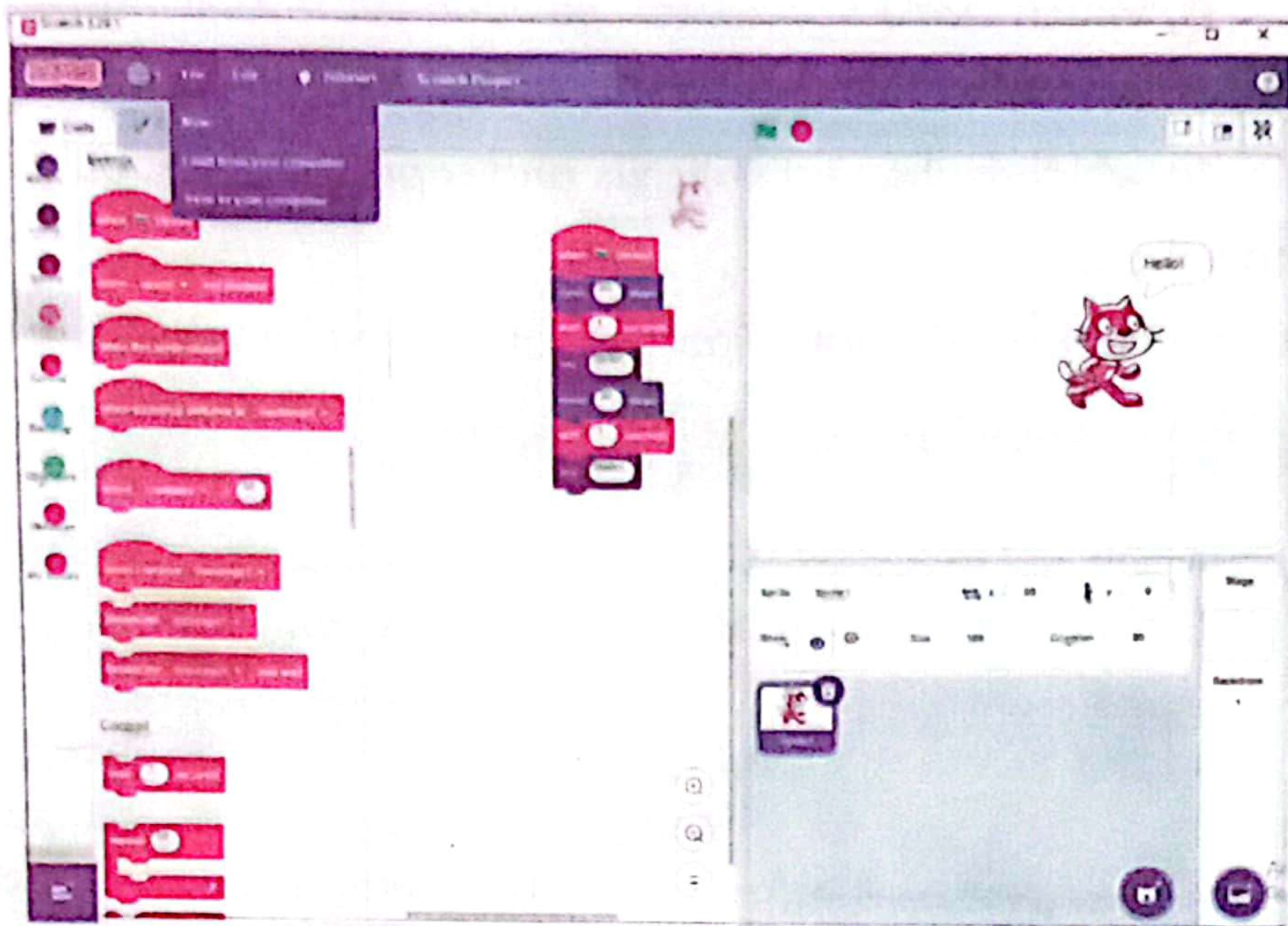
3 Type the file name "Project 1".

حفظ المشروع في ملف: لحفظ مشروعك، قم بما يلي:

1 من قائمة «ملف»، اختر «حفظ إلى جهاز الكمبيوتر الخاص بك».

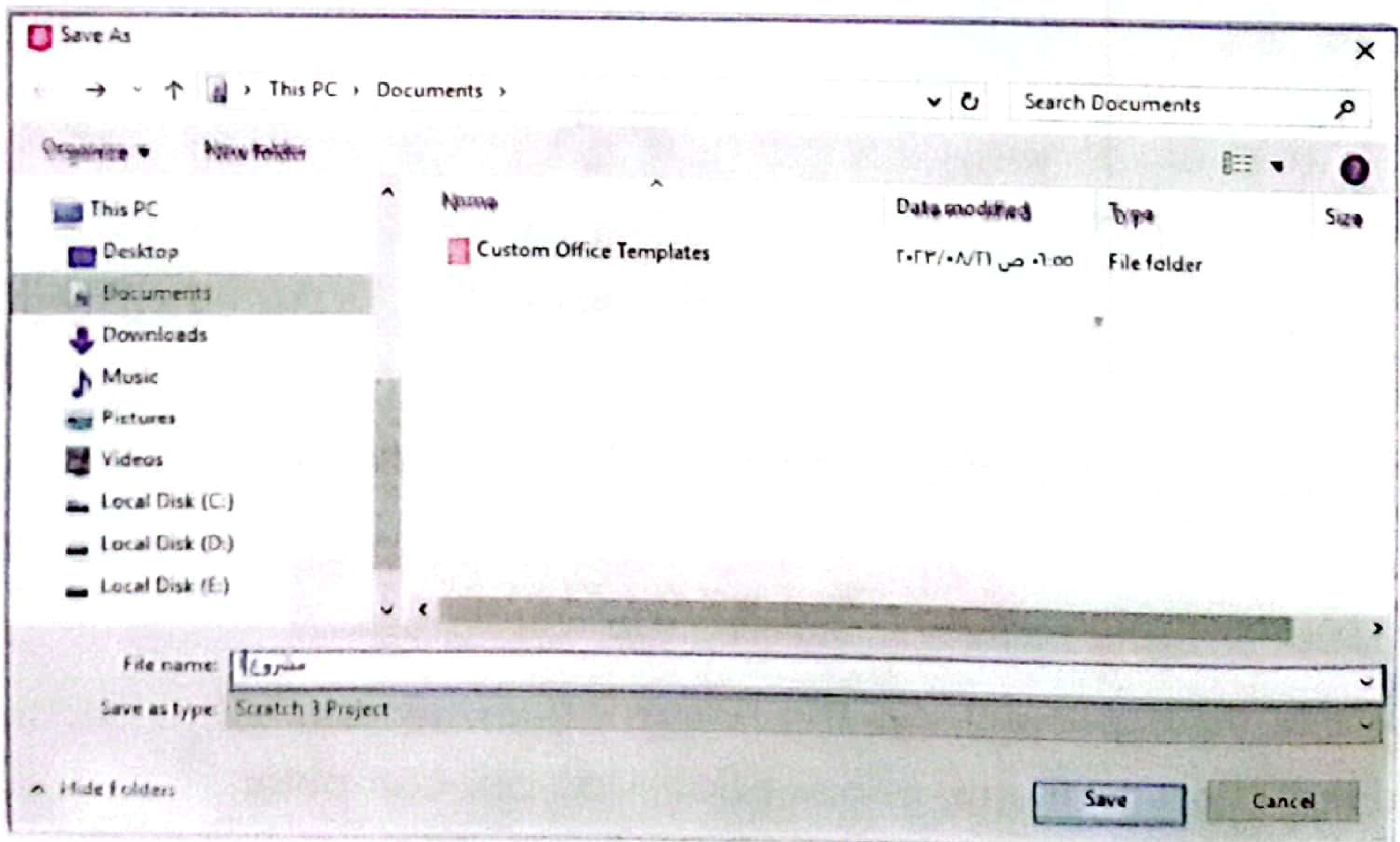
2 حدِّد مكان حفظ الملف على أحد وسائط التخزين.

3 اكتب اسم الملف «مشروع 1».



NOTES:

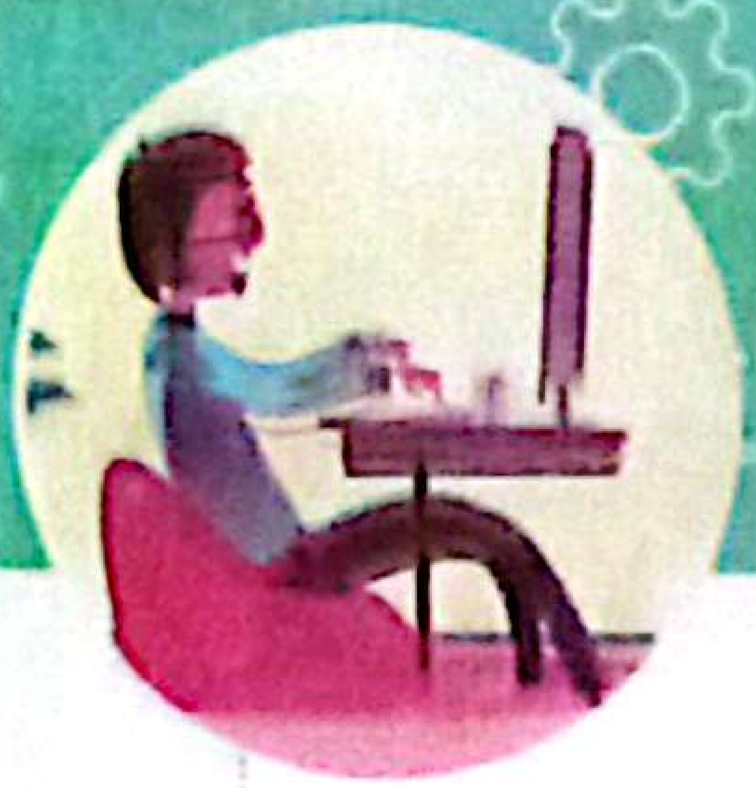
- The file name is "**Project 1.Sb3**".
- The file extension is **Sb3**.



- اسم الملف هو «Project 1.sb3».
- امتداد الملف هو Sb3.

أهم الكلمات والمصطلحات

File extension	امتداد الملف	Collaboration skills	مهارات التعاون
Animations	الرسوم المتحركة	Problem-solving skills	مهارات حل المشكلات
Interactive games	الألعاب التفاعلية	Drag and drop	السحب والإفلات
Programming principles	مبادئ البرمجة	Creative thinking	التفكير الإبداعي
Visual interface	واجهة مرئية	Explore	استكشاف
Command blocks	كتل الأوامر	Save the project	حفظ المشروع
Script area	منطقة النص البرمجي	Platform	المنصة
Stage area	منطقة العرض	Coordinates	الإحداثيات
Sprite object	الكائن	Horizontal axis	المحور الأفقي
Sprites area	منطقة الكائنات	Vertical axis	المحور الرأسي



Exercises on Lesson 4

1 Choose the correct answer:

1 Scratch uses .... to create programs.
a. command-lines
b. visual blocks
c. text-based
d. audio files

2 Scratch allows students to learn .... principles.
a. drawing
b. music
c. programming
d. all of them

3 Scratch can be used to create ....
a. games
b. animations
c. simulations
d. all of them

4 Scratch can be downloaded ....
a. for free
b. for a fee
c. with a subscription
d. none of them

5 The "Sprite" in Scratch represents a/an ....
a. background
b. object or character
c. command block
d. file menu

6 Scratch is a fun and .... educational tool.
a. difficult-to-use
b. easy-to-use
c. text-based
d. none of them

7 Scratch helps enhance .... skills.
a. problem-solving
b. collaboration
c. creative thinking
d. all of them

8 The .... shows the result of the work or project.
a. Menu Bar
b. Command Blocks Area
c. Script Area
d. Stage Area

9 The .... contains the objects used in the project.
a. Menu Bar
b. Command Blocks Area
c. Script Area
d. Sprites Area

10 When you make a Scratch project, to move the sprite, use the .... command group.

a. Looks b. Motion c. Events d. Control

11 To make the sprite move 30 steps, change the value in the "move" block to ....

a. 10 b. 30 c. 50 d. 100

12 To execute the project, click on the .... icon.

a. green flag b. red stop sign
c. blue arrow d. none of them

13 The "Wait" command is found in the .... blocks.

a. Motion b. Looks c. Events d. Control

14 To make the movement continuous, you can install the "move" command .... time(s).

a. one b. several c. zero d. none of them

15 X=0 represents the .... axis.

a. horizontal b. vertical c. diagonal d. none of them

16 To save a project, choose "Save to your computer" from the .... menu.

a. File b. Edit c. View d. Help

17 The file extension for Scratch projects is ....

a. .txt b. .docx c. .Sb3 d. .exe

2 Put (✓) or (✗):

1 📖 The Scratch program provides a very wide range of ideas that can be programmed. (   )

2 Scratch does not support collaboration on projects. (   )

3 📖 The Scratch program helps the student learn the principles of programming. (   )

4 📖 The Scratch program is considered a difficult educational tool to use. (   )

5 Scratch can be downloaded for free from its official website. ( )

6 📖 The student in the Scratch program needs to write a lot of complex codes. ( )

7 📖 Scratch uses a visual interface based on blocks. ( )

8 The Scratch program is paid. ( )

9 Scratch does not allow changing the language of the interface. ( )

10 The X and Y coordinates in Scratch represent the positions of a sprite on the stage. ( )

11 📖 In the Scratch program, students face difficulty in sharing projects with others. ( )

12 In the Scratch program, the Stage Area shows the programming sections. ( )

13 📖 In the Scratch program, the result of the work or project appears in the Area Blocks area. ( )

14 📖 To implement the project, click on the symbol 🏴. ( )

15 The "Sprite" in Scratch refers to the background of the project. ( )

3 Fill in the blanks:

1 The file extension for Scratch projects is ....

2 To change the language of the Scratch interface, go to the ....

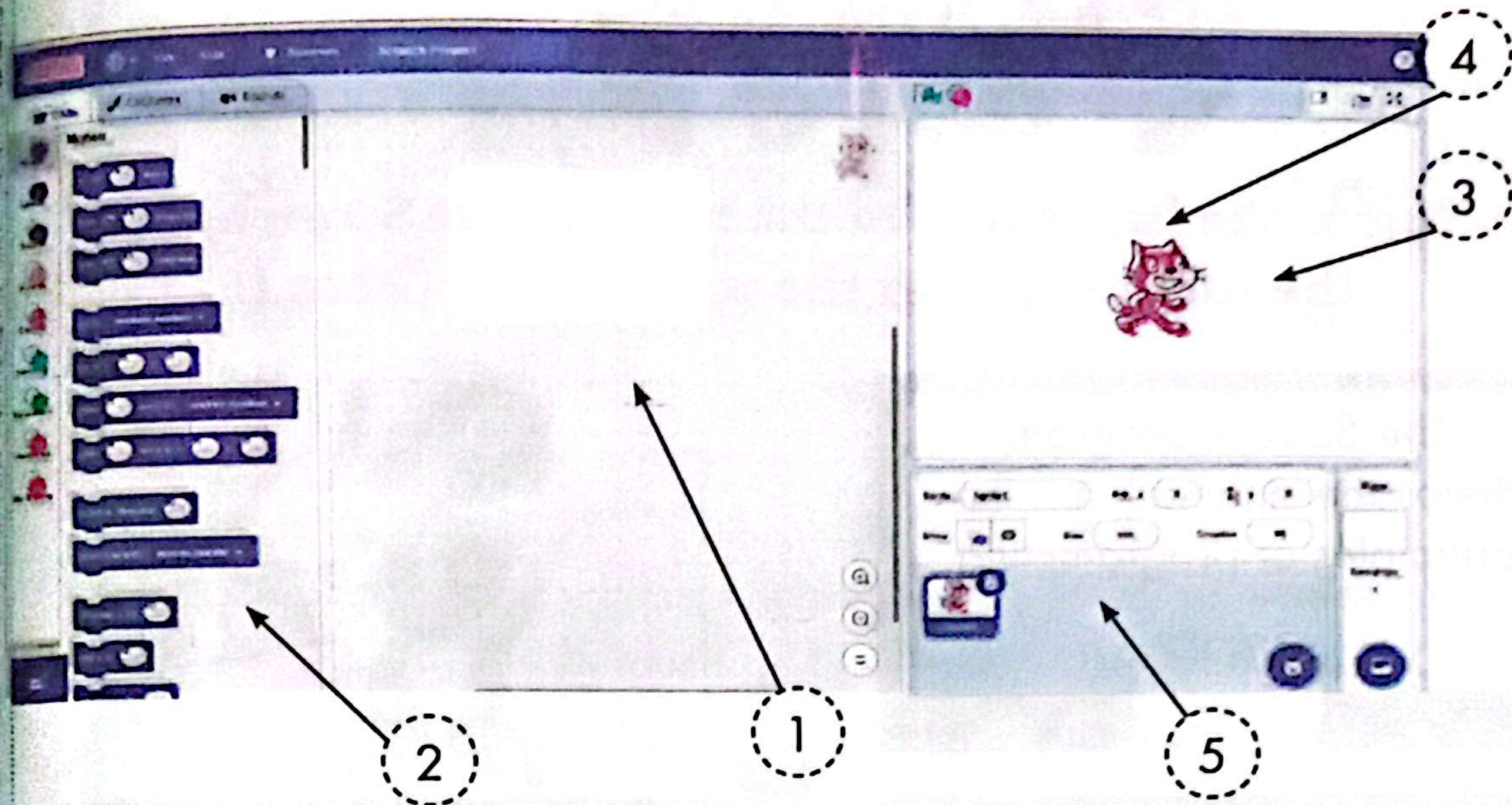
3 The .... in Scratch shows the characters or objects used in the project.

4 To create movement in Scratch, you use commands from the .... group.

5 To execute a Scratch project, click on the .... icon.

4 Label the following parts of the Scratch interface:

(Stage Area – Sprite – Script Area – Sprites Area – Command Blocks Area)



5 Arrange the following steps to create a Scratch project:

1 Drag and drop the blocks.

2 Click the green flag.

3 Open Scratch.

4 Save the project.

Play with PONY



This is the first time for the robot to use Scratch, help the robot discover the program by (T) or (F).



The Scratch program helps the student learn the principles of programming.







The Scratch program is considered a difficult educational tool to use.





The Scratch program provides a very wide range of ideas that can be programmed.



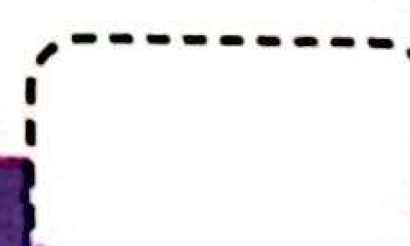


Scratch uses a visual interface based on blocks.



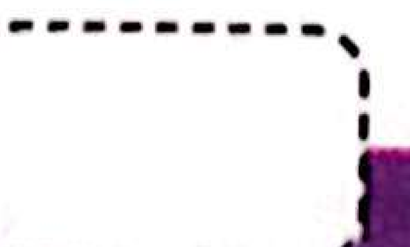


The Scratch program is paid.



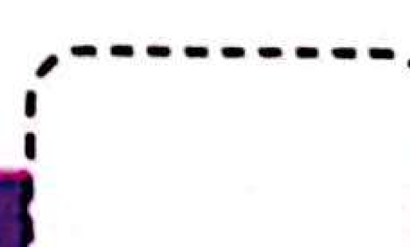


To implement the project, click on the symbol.





In the Scratch program, the Stage Area shows the programming sections.



Test Yourself on Lessons 3&4

1 Choose the correct answer:

1. Scratch uses a visual interface based on ....
   a. blocks   b. text   c. icons   d. menus
2. Sensors in robots act as their ....
   a. brain   b. muscles   c. senses   d. power source
3. The benefits of using robots in industry include ....
   a. decreasing human errors   b. improving productivity
   c. reducing accuracy   d. both a and b
4. To take pictures and videos, we use the .... sensors.
   a. sound   b. touch   c. light   d. vision
5. Y = 0 represents the .... axis in Scratch.
   a. horizontal   b. vertical   c. diagonal   d. none of them
6. The structure of a robot can be made of materials, such as ....
   a. metals   b. plastic   c. carbon   d. all of them
7. In Scratch program, you can save the project from the .... menu.
   a. Edit   b. Home   c. File   d. none of them

2 Put (✓) or (✗):

1. The Scratch program helps learning the principles of programming. (   )
2. Sensors help in moving robots in their surroundings. (   )
3. In the Scratch program, students face difficulty in sharing projects with others. (   )
4. The motors used in robots include electric and air motors. (   )
5. Robots do not need to use software in their work. (   )
6. In Scratch, the result of the project appears in the Sprites Area. (   )
7. The areas of use of robots include industry, healthcare, and education. (   )
8. The motor is the "brain" of the robot. (   )

Lesson 5

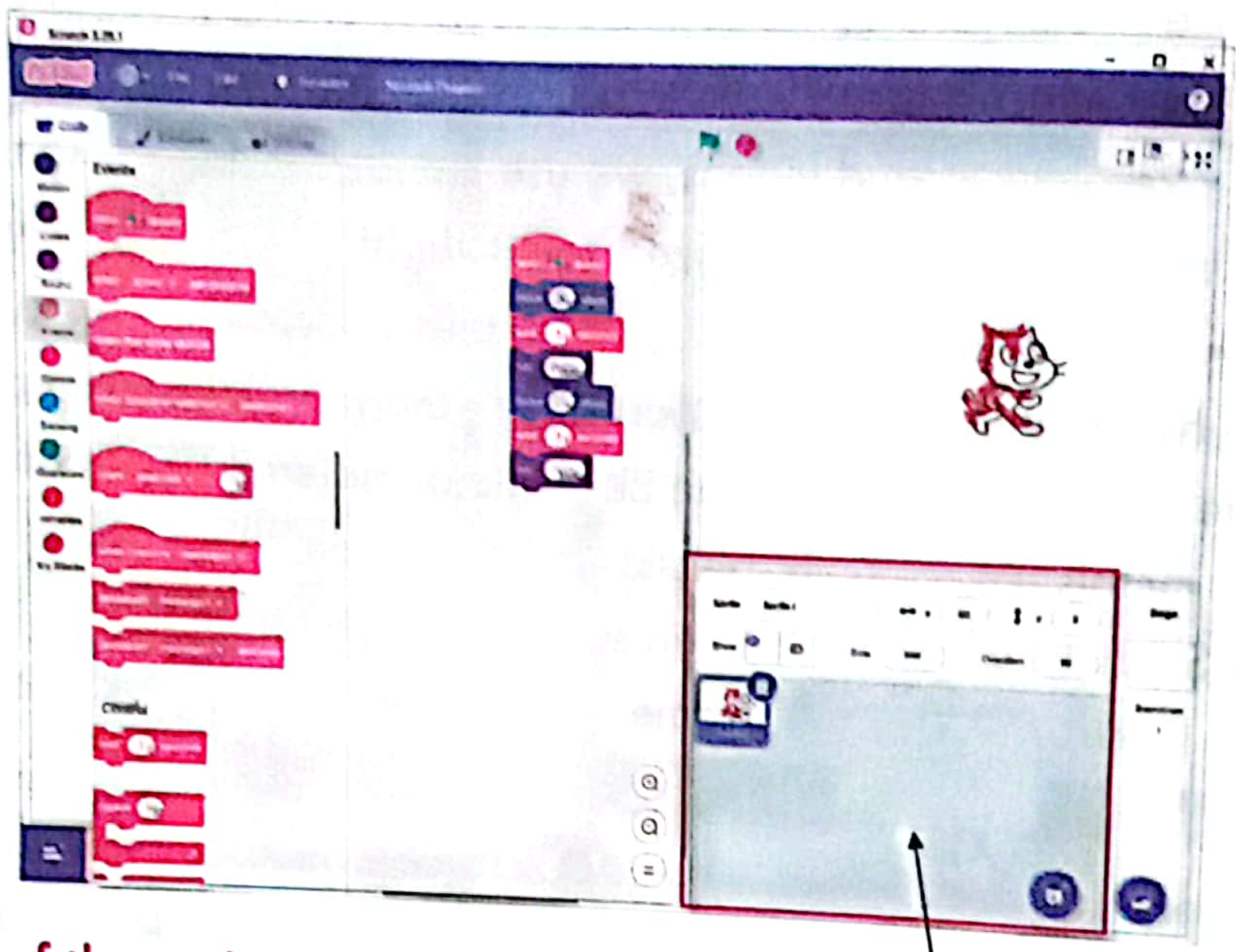
Sprites Area in Scratch

Sprites Area

- It contains the sprites used in the project.
- The sprites used in the project appear as follows:

منطقة الكائنات:

- تحتوي على الكائنات المستخدمة في المشروع.
- تظهر الكائنات المستخدمة في المشروع على النحو التالي:



1 **Name of the sprite:** You can modify it by clicking on it and renaming it.

2 **Location of the sprite:** It determines the position using the horizontal axis (X value) and the vertical axis (Y value).

- Note: the current location of the sprite (cat) on the platform is (60, 0).

3 **Direction of the sprite's movement:** You can change the direction by changing the Direction value.

4 **Show or hide the sprite** on the platform.

5 **Size of the sprite:** The value can be changed.

6 **Delete the sprite** from the platform.

7 **Add a new sprite:** Choose Sprite.

1 **اسم الكائن:** يمكنك تعديله بالنقر فوقه وإعادة تسميته.

2 **مكان الكائن:** يحدد مكان الكائن باستخدام المحور الأفقي (قيم X) والمحور الرأسي (قيم Y).

• لاحظ أن الموقع الحالي للكائن (القطة) على المنصة هو (0 و60).

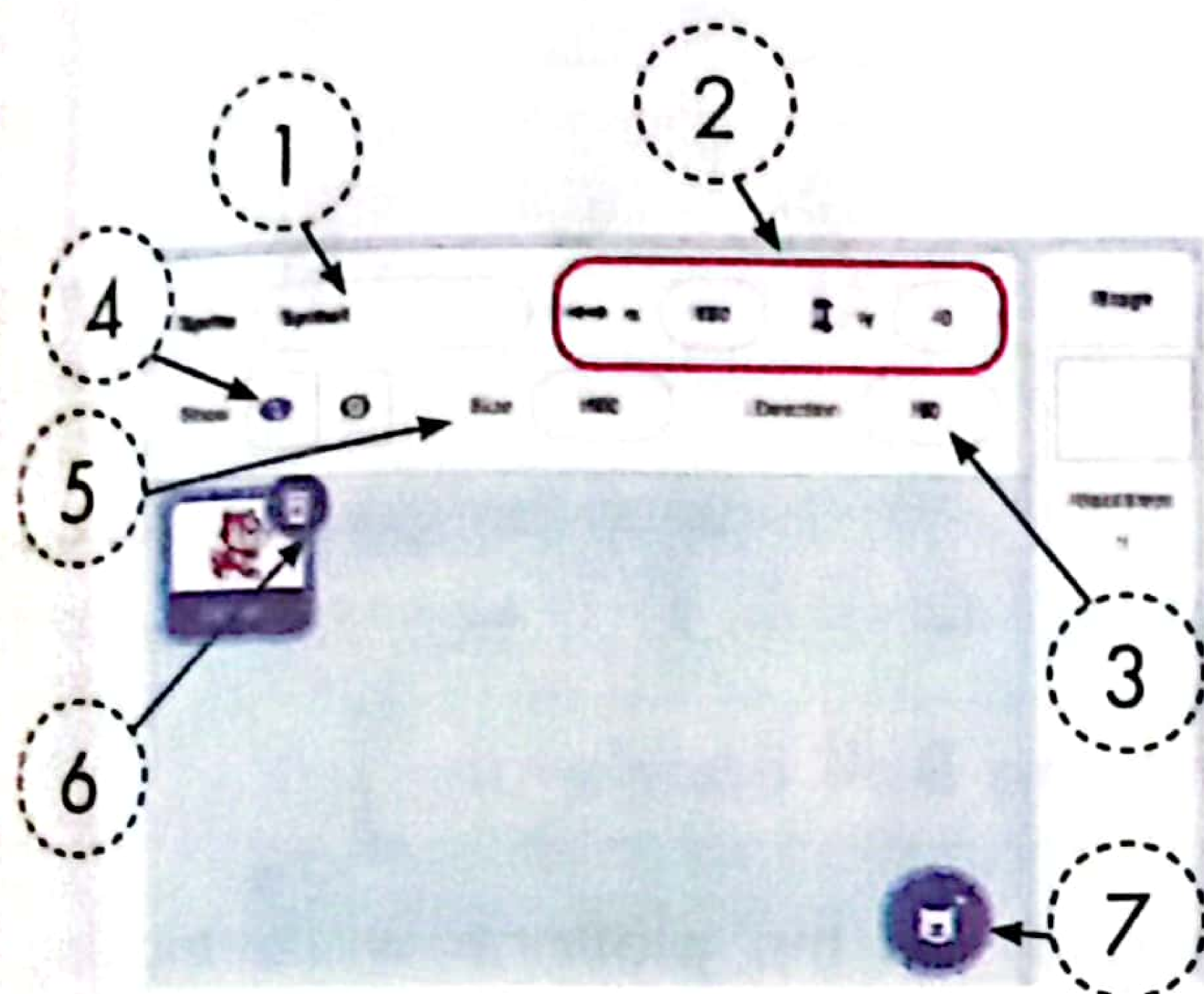
3 **اتجاه حركة الكائن:** يمكنك تغيير الاتجاه بتغيير قيمة Direction.

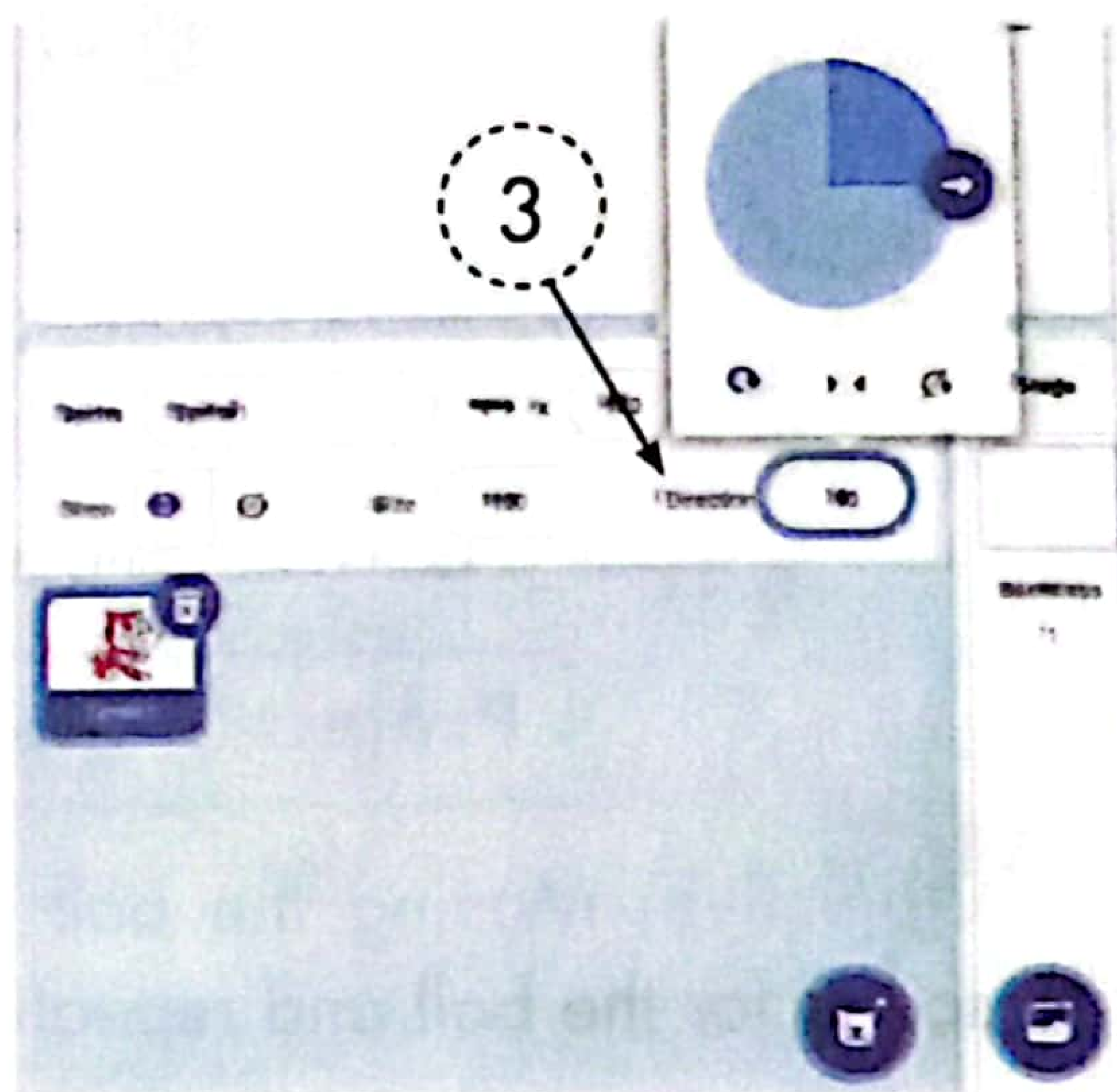
4 **إظهار الكائن أو إخفاؤه** على المنصة.

5 **حجم الكائن:** يمكن تغيير القيمة.

6 **حذف الكائن** من على المنصة.

7 **إضافة كائن جديد:** اختر الكائن.





Activity 1

1 Modify the name of the sprite.
2 Change the location of the sprite on the platform to (100, 80).
3 Change the direction of the sprite's movement.
4 Show or hide the sprite from the platform.
5 Change the size of the sprite to the value 50.
6 Delete the sprite from the platform.
7 Add a new sprite.

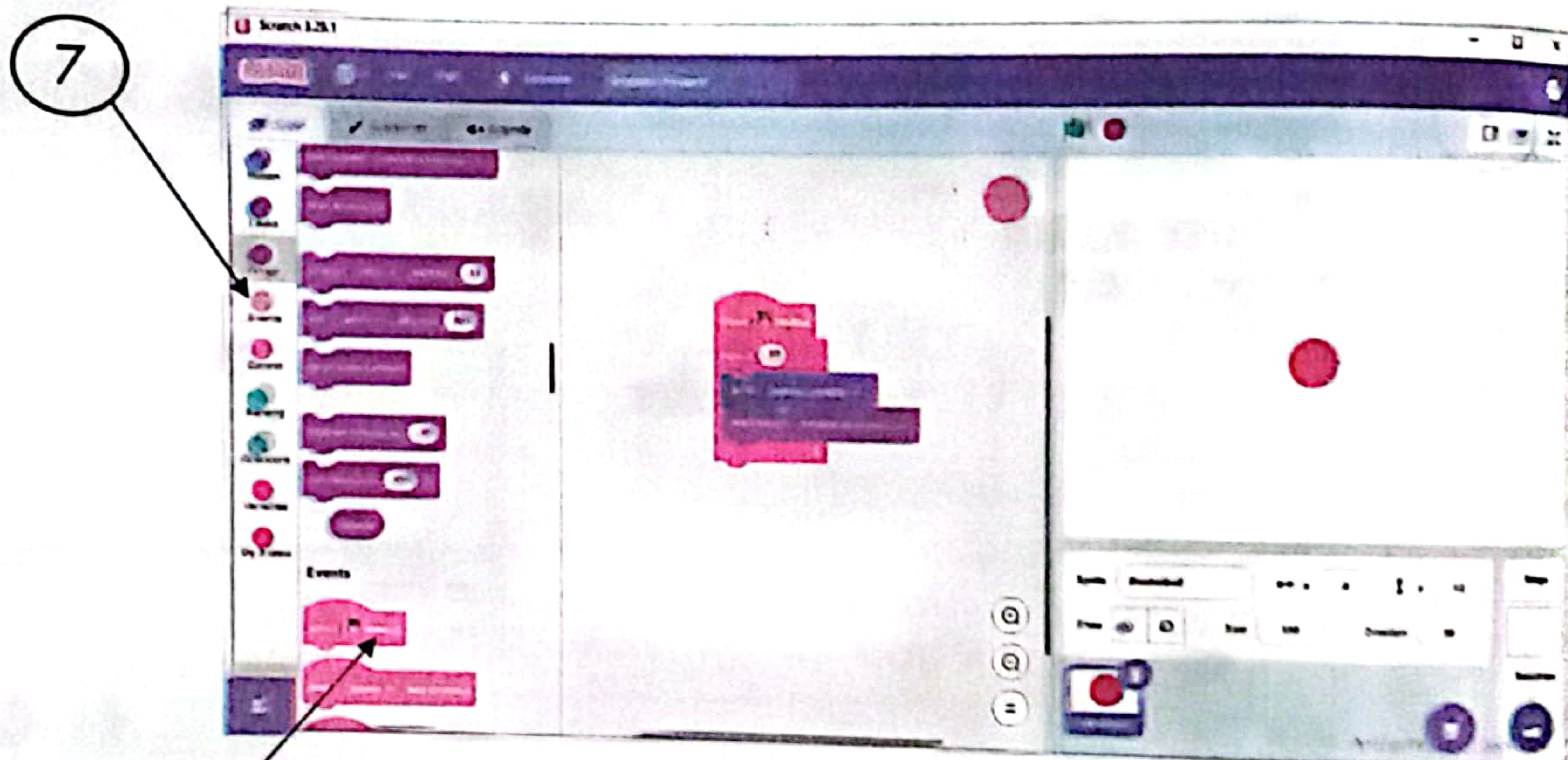
Add a New Sprite

• To add a new sprite in the sprites area:
1 Click on Choose Sprite.
2 Select Basketball.
3 Remove the cat sprite from the stage.

7 To execute the project, from **Events**:

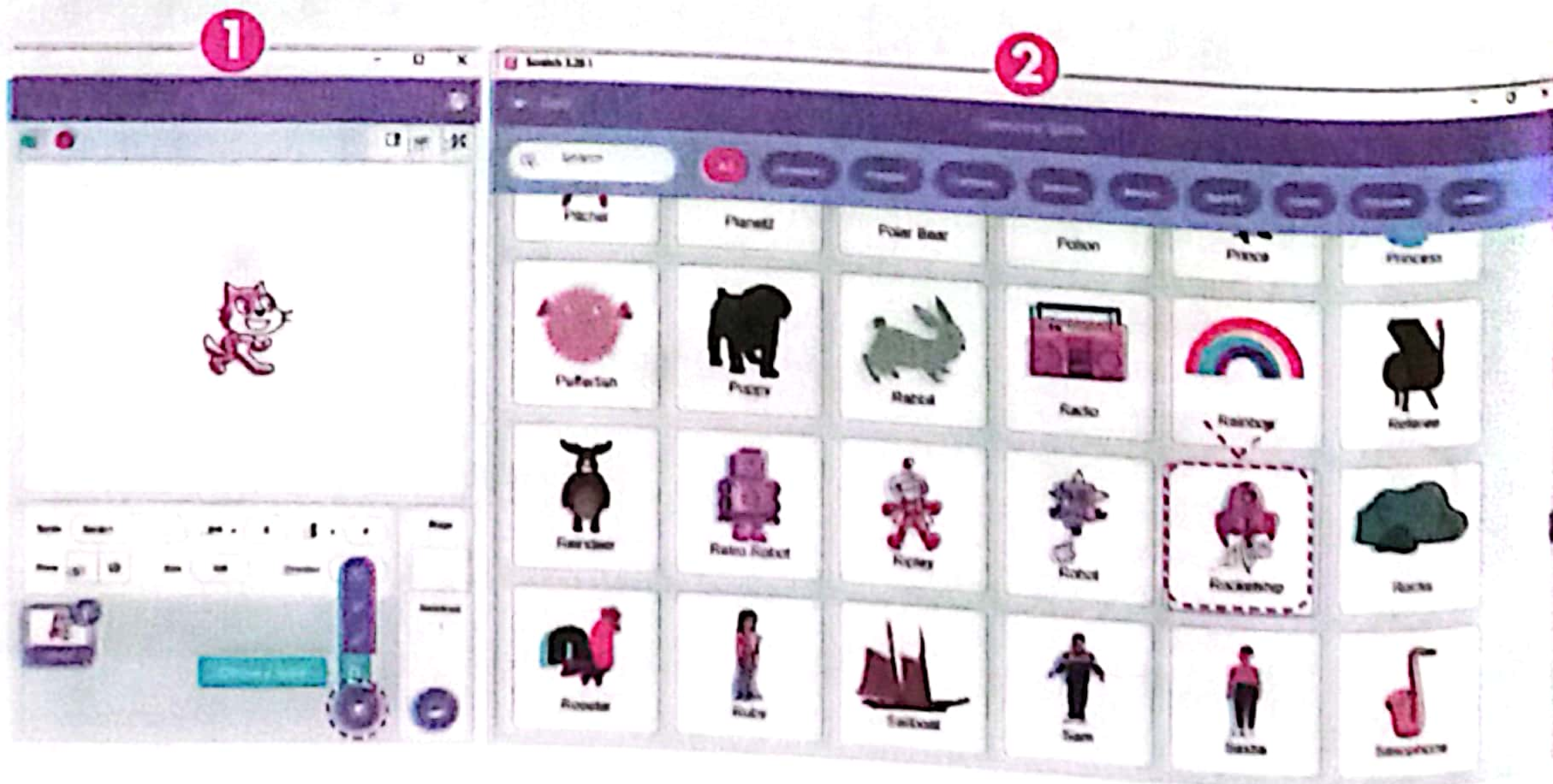
8 Choose the **When Clicked** command.

9 Test the execution of the project.



Project 3: Rocketship سفينة فضاء

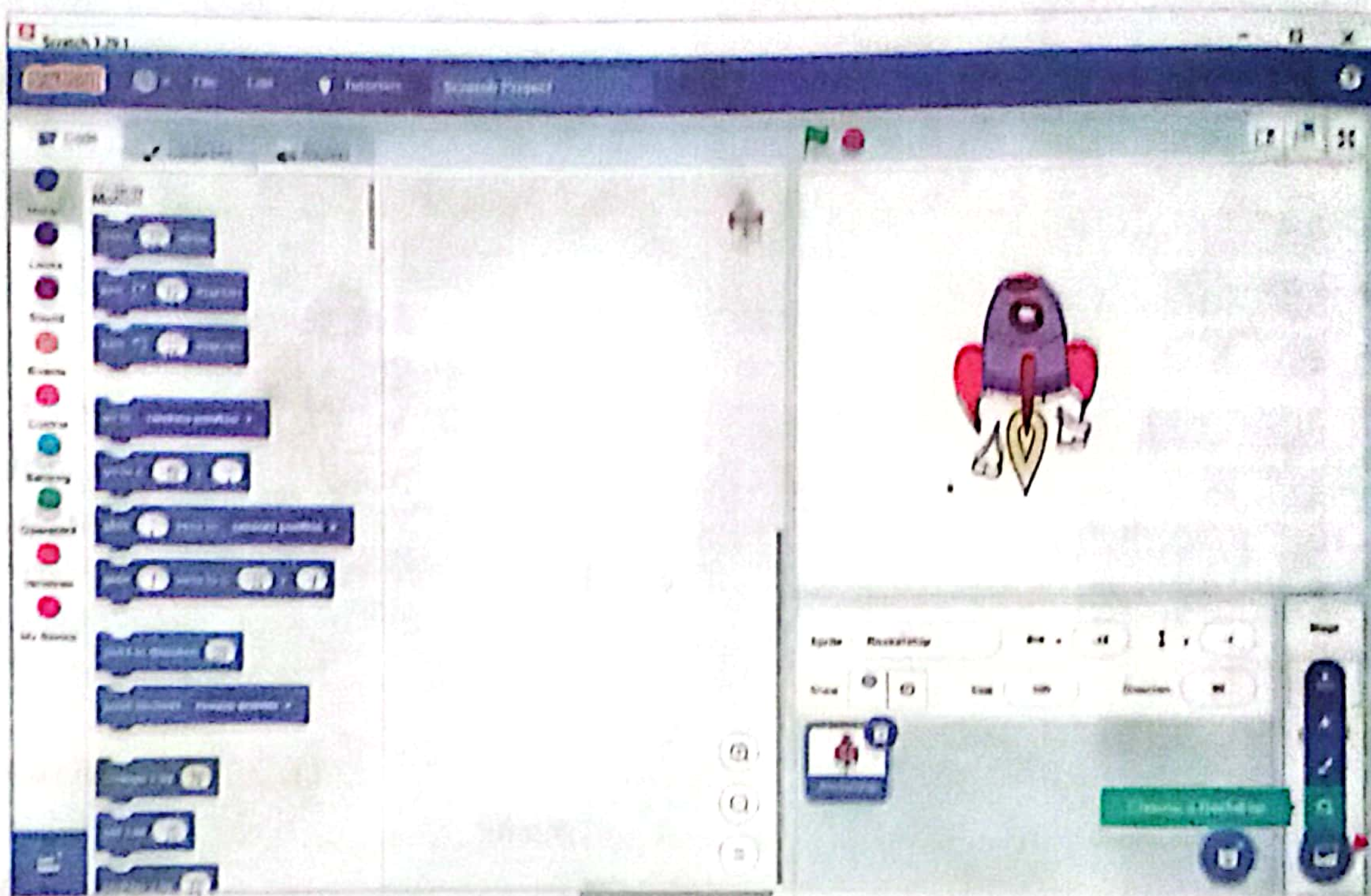
1 Insert a new sprite: Rocketship .



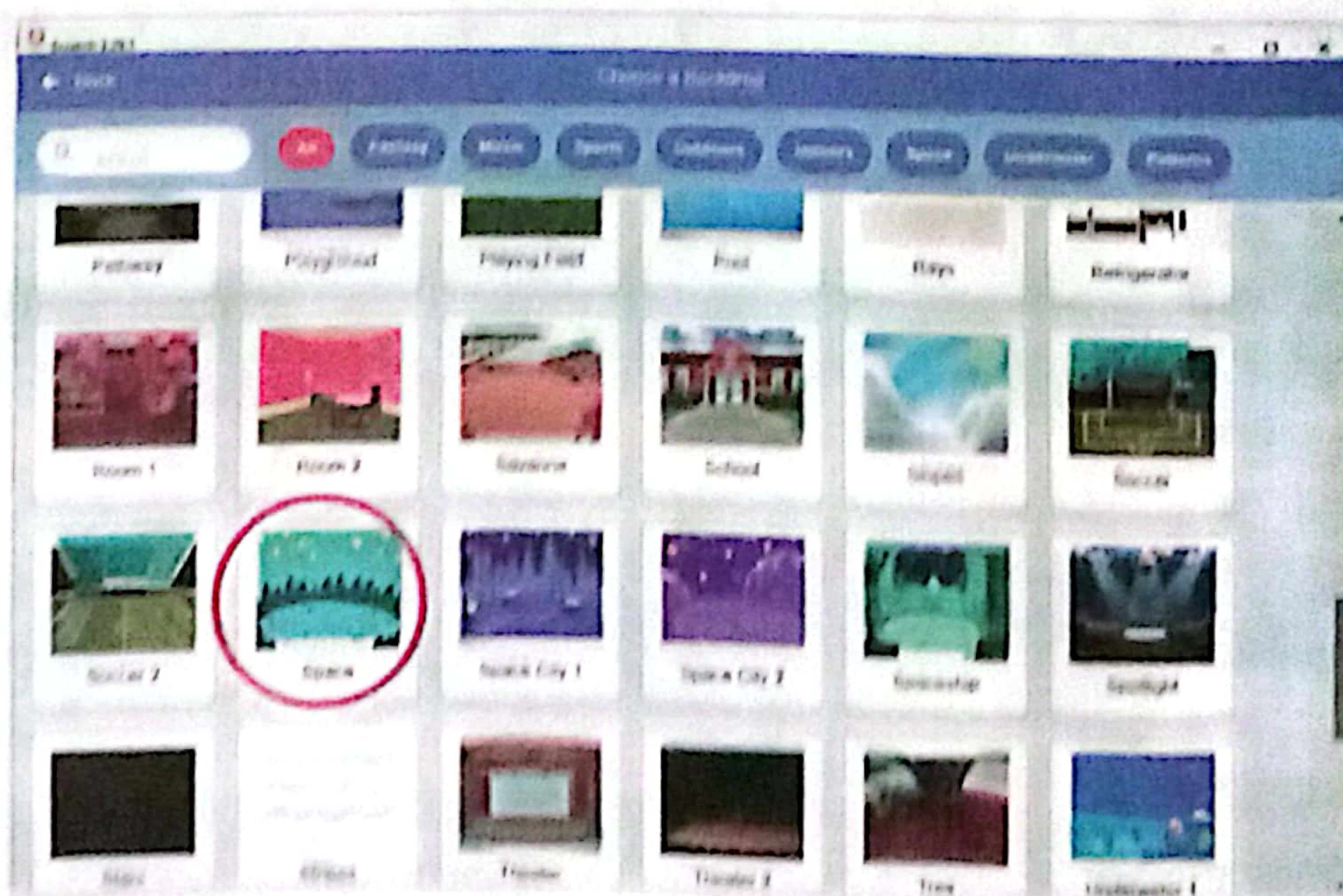
2 Remove the cat sprite from the stage.

Click Here

3 Insert a new background by clicking on Choose a Backdrop.

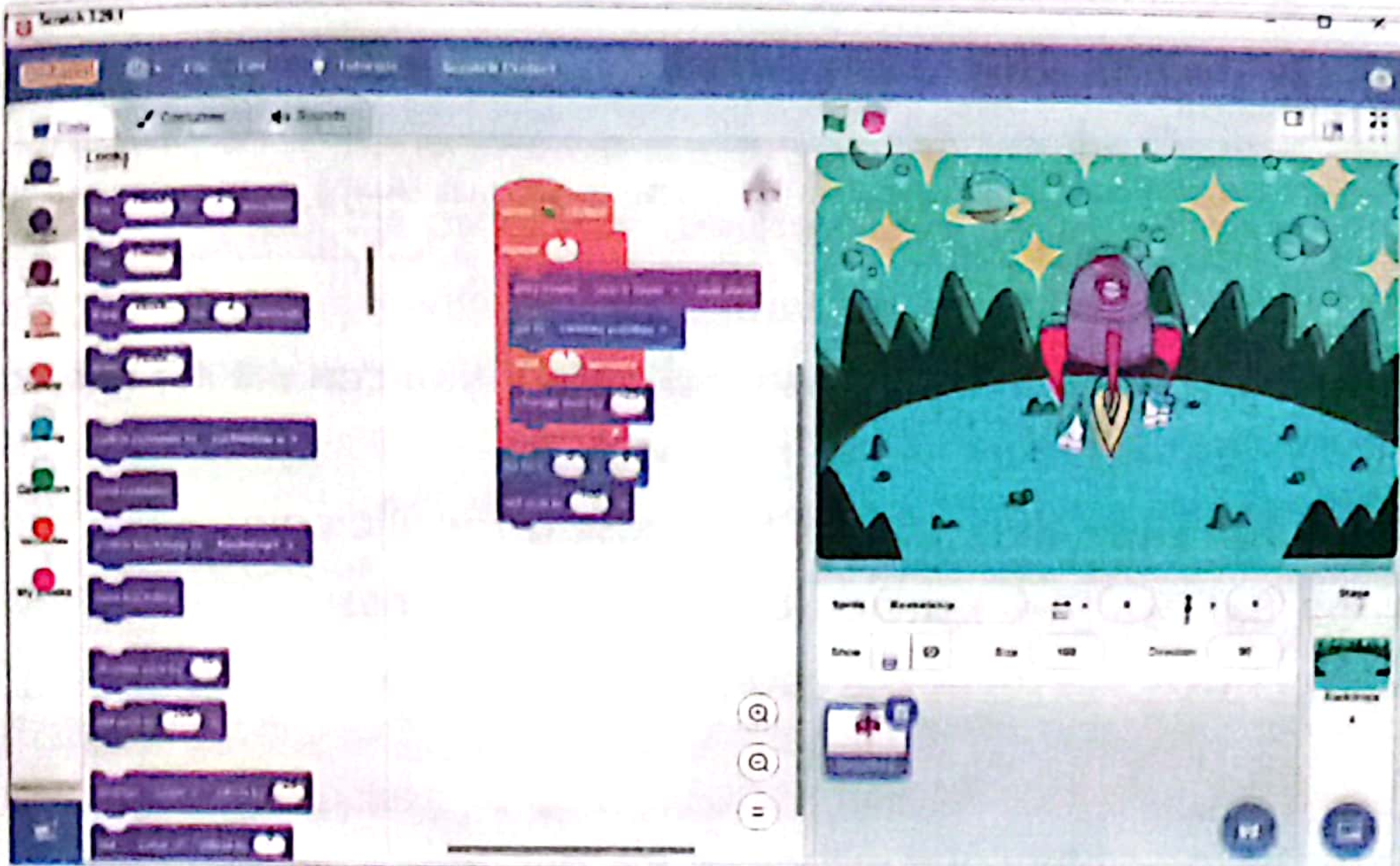


4 Browse through the different backgrounds, and then choose "Space".



Activity 2

1 Make the spaceship move randomly.
2 Make a sound for the spaceship.
3 Change the size of the spaceship. 4 Repeat this 5 times.
5 Make the spaceship's location on the platform start from (0, 0).

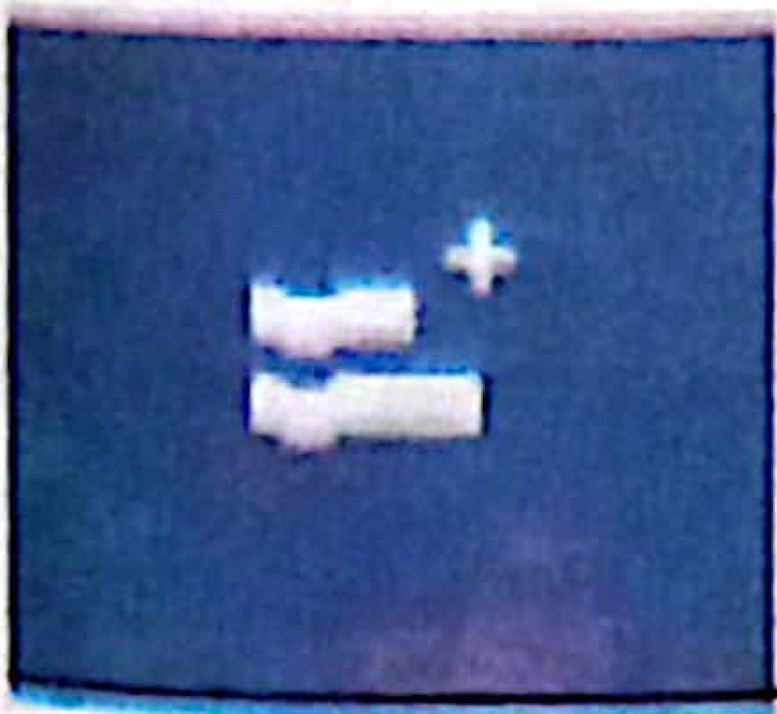


Project 4: Square Drawing Project

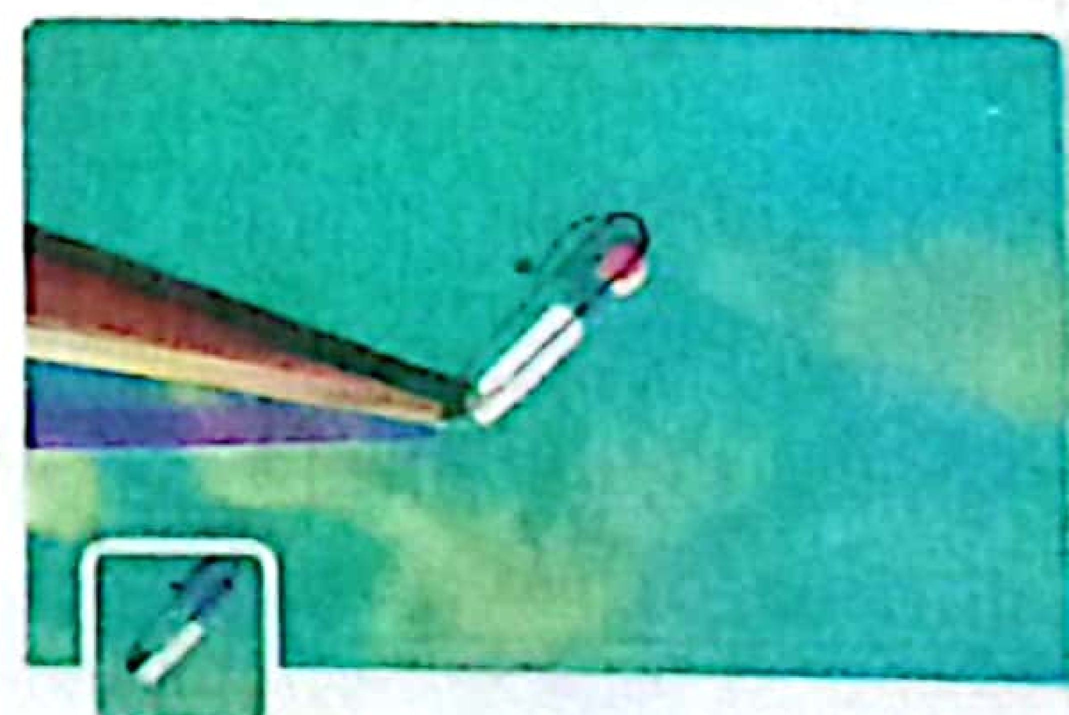
Objective: Drawing a square using Scratch's Pen extension.

Steps:

1 **Open a new project:** Open Scratch and start a new project.
2 **Select the pen:** We will use the "Pen" to draw our picture.
» In the code area, click on Add Extension, then select "Pen"







- The **pen blocks** will appear in the code area.
- Drag and drop the **"pen down"** block.
- This block will make the pen start drawing.

المشروع 4: مشروع رسم المربع:

- الهدف: رسم مربعًا باستخدام ملحق القلم في برنامج Scratch.
- الخطوات:

1 افتح مشروعًا جديدًا: افتح سكراتش وابدأ مشروعًا جديدًا.

2 اختر القلم: سنستخدم «القلم» لرسم صورتنا.

- في منطقة الكود، انقر فوق إضافة ملحق، ثم حدد «قلم».
- قم بسحب وإفلات لبنة «القلم لأسفل».
- ستظهر اللبنة «القلم» في منطقة الكود.
- ستجعل هذه الكتلة القلم يبدأ الرسم.

3 **Set Color and Size:** Before you start drawing, you can set the line color and size using the blocks in the "Pen" section.

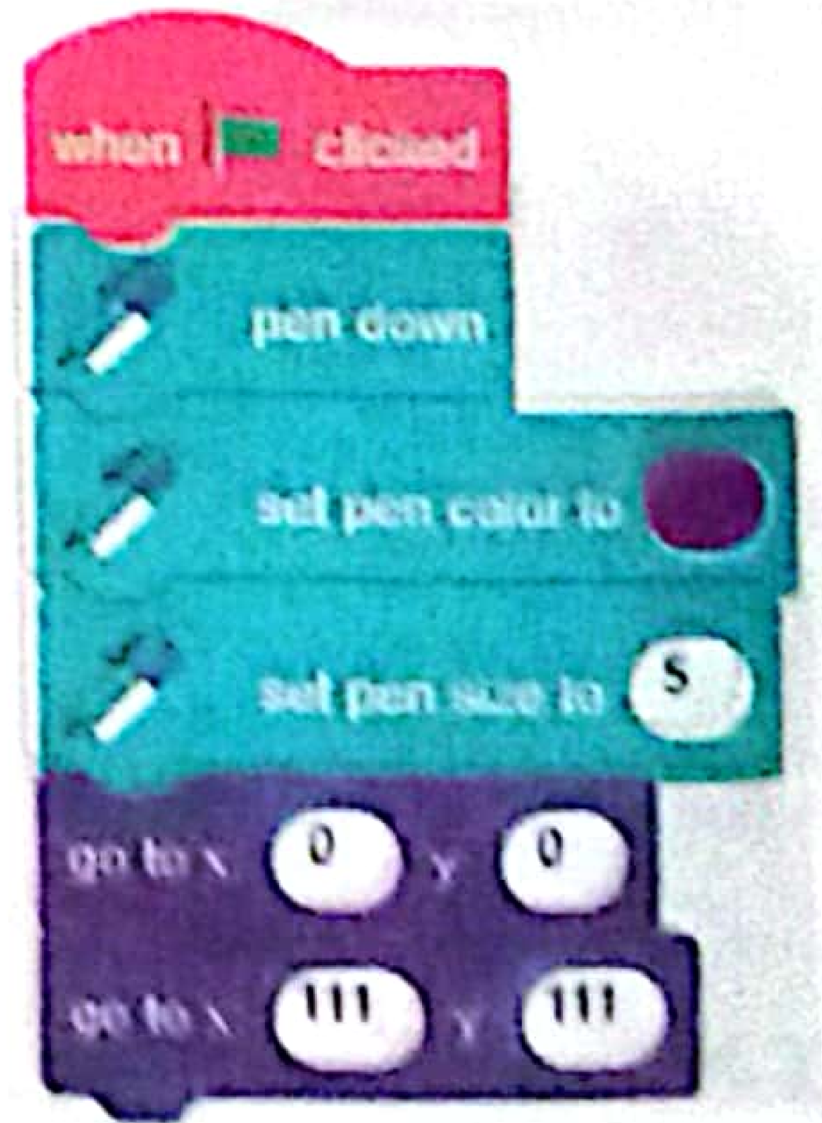
- Use the **Set Pen Color to** block to choose a specific color.
- Use the **Set Pen Size to** block to set the line thickness.

3 تحديد اللون والحجم: قبل البدء بالرسم، يمكنك تحديد لون الخط وحجمه باستخدام اللبنات الموجودة في قسم «القلم».

- استخدم اللبنة «تعيين لون القلم إلى» لاختيار لون معين.
- استخدم اللبنة «تعيين حجم القلم إلى» لتحديد سمك الخط.

4 **Moving the Pen:** Now, we will move the pen to draw the shape we want.

- From Motion blocks: Use the Go to x:y: block to set the starting point.
- Then use the Go to x:y: block again to set the ending point.
- This will make the pen draw a straight line between the two points.



4 تحريك القلم: الآن، سنقوم بتحريك القلم لرسم الشكل الذي نريده.

- من Motion blocks استخدم لبنة «اذهب إلى X:Y» لتحديد نقطة البداية.
- استخدم لبنة «اذهب إلى X:Y» مرة أخرى لتحديد نقطة النهاية.
- هذا سيجعل القلم يرسم خطًا مستقيمًا بين النقطتين.

5 **Repeating Steps:** Repeat the previous steps to draw more lines and form the shape you want.

4 تكرار الخطوات: كرِّر الخطوات السابقة لرسم المزيد من الخطوط وتكوين الشكل الذي تريده.

NOTES:

- **Drawing different shapes:** You can draw any geometric shape by setting the start and end points of the lines appropriately.
- **Adding details:** You can add details to your image, such as eyes, mouth, and ears.
- **Drawing a circle:** To draw a circle, you can use the **Repeat** block to repeat the process of drawing short lines at different angles. This helps with the circle drawing effect.

- **رسم أشكال مختلفة:** يمكنك رسم أي شكل هندسي عن طريق تحديد نقاط بداية ونهاية الخطوط بشكل مناسب.
- **إضافة التفاصيل:** يمكنك إضافة تفاصيل إلى صورتك مثل: العيون والفم والأذنين.
- **رسم دائرة:** لرسم دائرة، يمكنك استخدام لبنة «كرر» لتكرار عملية رسم خطوط قصيرة بزوايا مختلفة، هذا يساعد في تأثير رسم الدائرة.

اهم الكلمات والمصطلحات

Sprites area	منطقة الكائنات	Play sound	تشغيل الصوت
Set up a project	إعداد مشروع	Repeat command	أمر التكرار
Horizontal axis	المحور الأفقي	Click command	أمر النقر
Vertical axis	المحور العمودي	Rocketship	صاروخ الفضاء
Current location	الموقع الحالي	Backdrop	الخلفية
Platform	المنصة	Square Drawing	رسم مربع
Direction	اتجاه	Add extension	إضافة امتداد
Show or hide	إظهار أو إخفاء	Pen color	لون القلم
Choose sprite	اختيار كائن	Line thickness	سمك الخط
Go to random position	الذهاب إلى موقع عشوائي	Starting point	نقطة البداية
Geometric shape	شكل هندسي	Ending point	نقطة النهاية



Exercises on Lesson 5

1 Choose the correct answer:

1 The Sprites Area in Scratch contains ....

a. backgrounds b. sprites c. sounds d. blocks

2 The X and Y values in Scratch represent the ....

a. size of the sprite b. direction of the sprite

c. location of the sprite d. color of the sprite

3 To add a new sprite, click on.................... .

a. Choose Sprite b. Delete Sprite

c. Rename Sprite d. Move Sprite

4 The "Go to random position" command is found in the .... group.

a. Motion b. Sound c. Control d. Events

5 The "Pen" extension is added by clicking on ....

a. Choose Sprite b. Add Extension

c. Delete Sprite d. Change Backdrop

6 To make the ball move randomly, use the .... command.

a. Go to random position b. Move 10 steps

c. Turn 15 degrees d. none of them

7 To draw a geometric shape, you need to set the .... points of the lines.

a. random b. middle c. start and end d. none of them

8 The "Repeat" command is used to ....

a. delete a sprite b. execute actions multiple times

c. change the backdrop d. play a sound

9 The "When Clicked" command is found in the .... group.

a. Sound b. Motion c. Control d. Events

10 The "Pen" extension is used to ....

a. move sprites b. draw shapes and lines

c. play sounds d. change the background

11 The "Set Pen Color to" block is used to ....

a. change the pen size
b. change the pen color
c. move the pen
d. delete the pen

12 The background "Space" is chosen by clicking on ....

a. Choose a Backdrop
b. Choose a Sprite
c. Choose a Sound
d. Choose a Motion

13 To move the pen to a specific point, use the .... block.

a. Go to x: y:
b. Move 10 steps
c. Turn 15 degrees
d. none of them

2 Put (✓) or (✗):

1 📖 The sprites used in the project appear in the Sprites Area. (   )

2 📖 The sprite name can be modified only once. (   )

3 📖 The location of the sprite on the platform is determined by the value of the horizontal axis X only. (   )

4 📖 The horizontal and vertical axes are used to know the current location of the sprite on the platform. (   )

5 📖 To modify the name of the sprite, click on its current name and rename it. (   )

6 📖 The direction of the sprite's movement can be changed by clicking on the word "Direction". (   )

7 📖 The sprite can be shown or hidden on the platform by clicking on Choose Sprite. (   )

8 📖 The size of the sprite is changed by its value in the Sprites Area. (   )

9 📖 The sprite can be deleted from the platform. (   )

10 📖 Only one sprite can be added to the platform. (   )

11 📖 To add a new sprite, click on Choose Sprite. (   )

12 📖 The Stop command is used to watch the project execution. (   )

13 The "pen down" block makes the pen start drawing. (   )

14 A new background is inserted to the project through the programming area. ( )

15 The Start command is used to stop the project. ( )

16 We use the coordinates (x, y) to locate the point on the stage. ( )

3 Complete the following sentences:

1 The Sprites Area in Scratch contains the .... used in the project.

2 To add a new sprite in Scratch, click on the .... button in the Sprites Area.

3 .... block is used to draw a line in Scratch.

4 To change the direction of a sprite, modify the .... value.

5 To repeat a set of commands 10 times, use the .... block from the Control group.

4 Match:

Block	Function
1 Go to random position	a. Repeats a set of commands
2 Play sound	b. Starts the program when the flag is clicked
3 Set pen size to	c. Changes the thickness of the line
4 Repeat	d. Makes the sprite move randomly
5 "When Clicked" command	e. Plays a sound effect

1 .... 2 .... 3 .... 4 .... 5 ....

5 Arrange the following steps to create a project where a sprite moves randomly:

a. Choose "Go to random position" from Motion.
b. Select "When Clicked" from Events.
c. Choose "Play sound" from Sound.
d. Use the "Repeat" block from Control to repeat the action 10 times.

Play with PONY





Order the following steps to help the Robot draw a square in Scratch: program



- ◯ **Select the pen.**
- ◯ **Repeat the previous steps to draw more lines.**
- ◯ **Open Scratch and start a new project.**
- ◯ **Set the Color and Size.**
- ◯ **Move the pen to draw the shape it wants.**

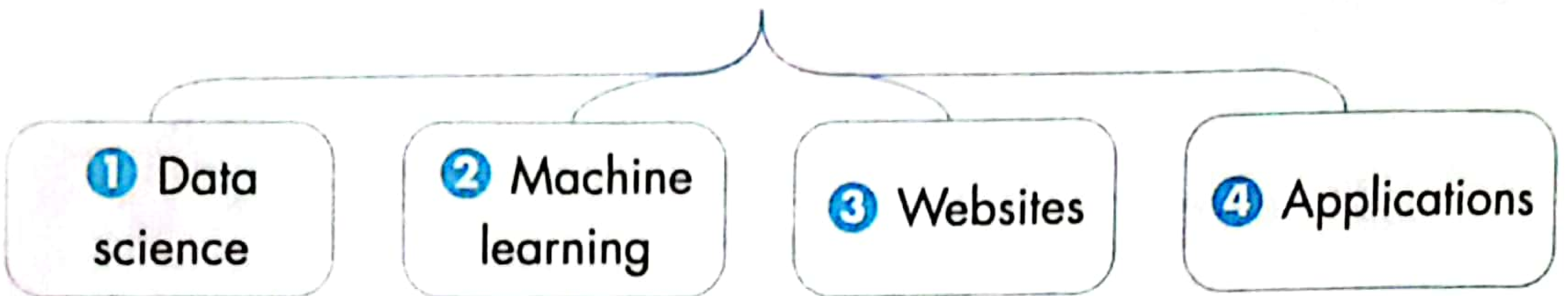
Lesson 6

Principles of Python

What is Python?

- The first version of Python was released in 1991.
- Python is a programming language widely used in developing:





ما هي لغة البايثون؟

- تم إصدار أول نسخة من بايثون في عام 1991.
- بايثون هي لغة برمجة تستخدم على نطاق واسع في علم البيانات والتعلم الآلي (Machine Learning)، ولتطوير المواقع والتطبيقات.

Features of Python مميزات بايثون

1. **Open source:** Python is free and open source, allowing everyone to use and develop it.
2. **Interpreted language:** It translates programming codes line by line, so if there are errors in the program code, it will stop working, allowing programmers to quickly find errors.
3. **Versatility:** It can be used in developing web applications, data science, artificial intelligence, machine learning, and game programming.
4. **Easy-to-use language:** It is one of the easiest programming languages for beginners because of:
   1. Its simple and organized syntax
   2. Using words similar to English.

5 **Integration:** Python can be integrated with other languages, such as C, C++, and Java, and it can also be used in developing multi-platform programs.

6 **Libraries:** Python has many libraries that you can use.

1 مفتوحة المصدر: لغة بايثون مجانية ومفتوحة المصدر؛ مما يسمح للجميع باستخدامها وتطويرها.

2 لغة مفسرة: تترجم الأكواد البرمجة سطرًا بسطر؛ لذلك إذا كان هناك أخطاء في كود البرنامج، فسيتوقف العمل؛ مما يسمح للمبرمجين بالعثور على الأخطاء في الأكواد بسرعة.

3 تعدد الاستخدامات: يمكن استخدامها في تطوير تطبيقات الويب وعلوم البيانات والذكاء الاصطناعي والتعلم الآلي وبرمجة الألعاب

4 لغة سهلة الاستخدام: تعد من أسهل لغات البرمجة للمبتدئين؛ بسبب:

1. تركيبها النحوي البسيط والمنظم.
2. استخدام كلمات مشابهة للغة الإنجليزية.

5 التكامل: يمكن دمج لغة البايثون مع لغات أخرى مثل C وC++ وJava، ويمكن أيضًا استخدامها في تطوير البرامج متعددة الأنظمة

6 المكتبات: تحتوي لغة البايثون على العديد من المكتبات التي يمكنك استخدامها.

Python Libraries

- They are pre-built codes and functions that help programmers perform specific tasks without having to write codes from scratch.
- Libraries are a powerful tool that increases the efficiency and effectiveness of programming using Python, providing ready-made solutions to many common problems or requirements.

• مكتبات بايثون:

- هي أكواد ووظائف مجهزة مسبقًا تساعد المبرمجين على أداء مهام محددة دون الحاجة إلى كتابة الأكواد من الصفر.
- المكتبات هي أداة قوية تزيد من كفاءة وفعالية البرمجة باستخدام بايثون؛ حيث توفر حلولًا جاهزة للعديد من المشاكل أو المتطلبات الشائعة.

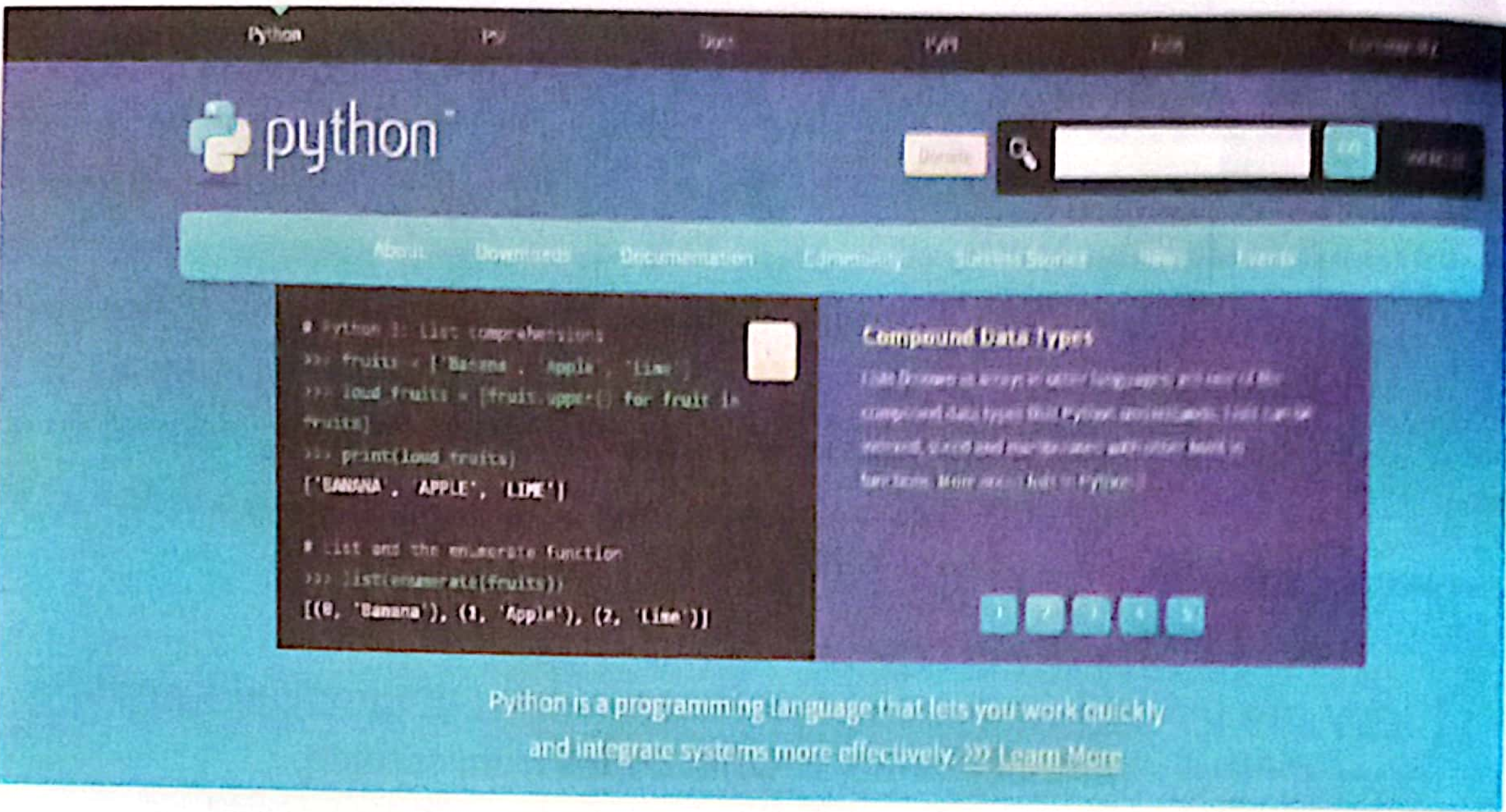
Examples of Python Libraries:

- **NumPy:** It is widely used in data science, statistics, and artificial intelligence.
  - مكتبة تستخدم بشكل كبير في علوم البيانات والإحصاء والذكاء الاصطناعي.
- **Pandas:** It is used for analyzing and processing data.
  - مكتبة لتحليل ومعالجة البيانات.
- **Matplotlib:** It is used for creating graphs and charts.
  - مكتبة لإنشاء الرسوم البيانية والمخططات.

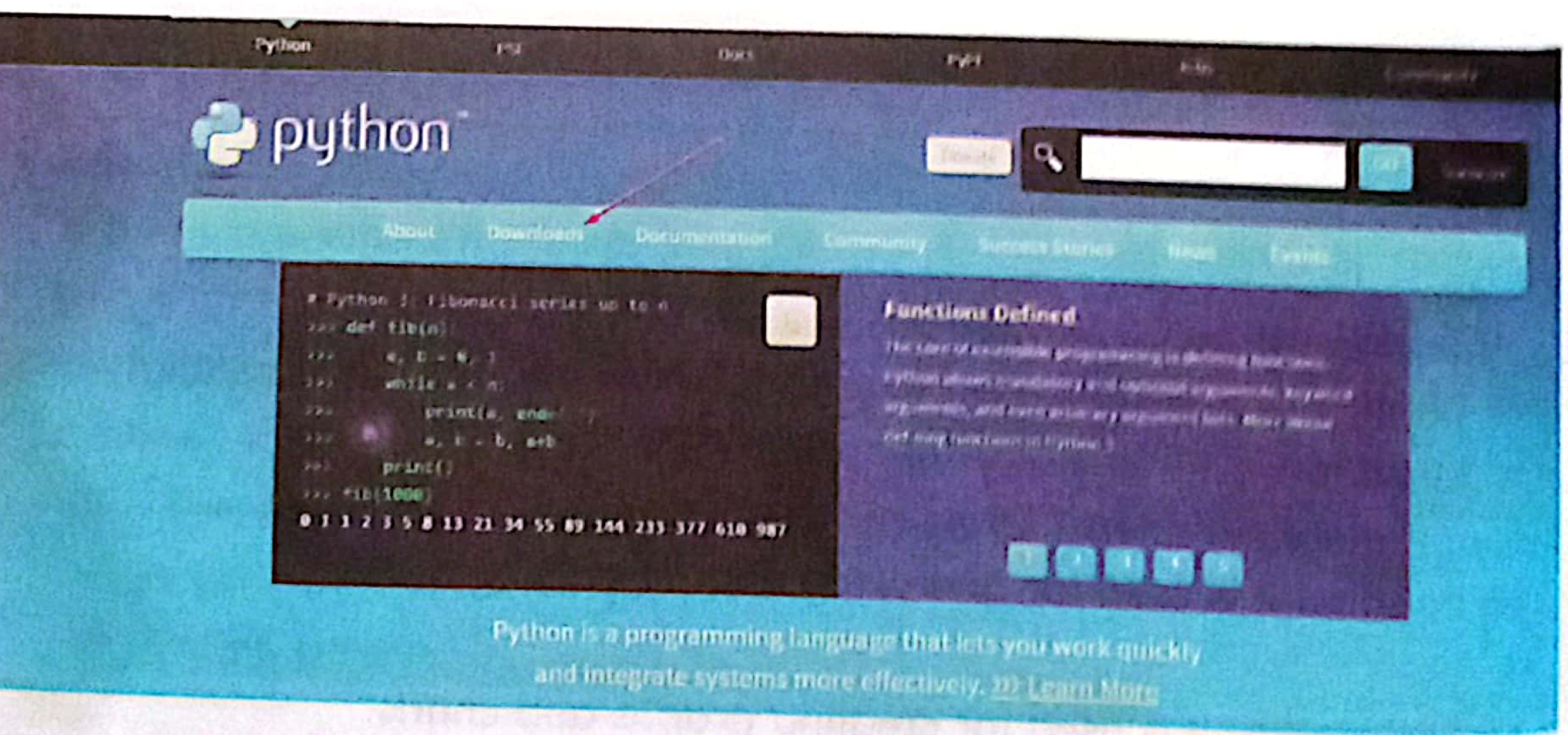
How to Download the Program from the Official Website



1 Visit the official Python website: www.python.org



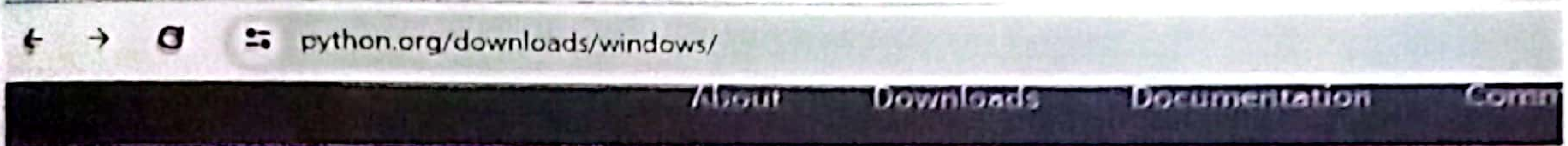
2 Choose Download.



3 Then, choose the system you are working on (Windows, Mac, or Linux).



4 You must choose **64 bit** or **32 bit**, according to your device specifications.



Python ››› Downloads ››› Windows

Python Releases for Windows

- Latest Python 3 Release - Python 3.13.0

Stable Releases

- Python 3.13.0 - Oct. 7, 2024

  Note that Python 3.13.0 *cannot* be used on Windows 7 or earlier.

  - Download Windows installer (64-bit)
  - Download Windows installer (32-bit)
  - Download Windows installer (ARM64)
  - Download Windows embeddable package (64-bit)
  - Download Windows embeddable package (32-bit)
  - Download Windows embeddable package (ARM64)

5 After downloading, install the program on your device and follow the instructions.

Python 3.13.0 (64-bit) Setup

Install Python 3.13.0 (64-bit)

Select Install Now to install Python with default settings, or choose Customize to enable or disable features.

Install Now
C:\Users\ \AppData\Local\Programs\Python\Python313

Includes IDLE, pip and documentation
Creates shortcuts and file associations

→ Customize installation
Choose location and features

python for windows

Use admin privileges when installing py.exe
Add python.exe to PATH

Cancel

Python 3.13.0 (64-bit) Setup

Setup was successful

New to Python? Start with the online tutorial and documentation. At your terminal, type "py" to launch Python, or search for Python in your Start menu.

See what's new in this release, or find more info about using Python on Windows.

python for windows

Close

أهم الكلمات والمصطلحات

Multi-platform programs	برامج متعددة المنصات	Integration	التكامل
Official website	الموقع الرسمي	Web applications	تطبيقات الويب
First version	الإصدار الأول	Python libraries	مكتبات بايثون
Data science	علم البيانات	Pre-built codes	أكواد مدمجة مسبقًا
Machine learning	التعلم الآلي	Efficiency and effectiveness	الكفاءة والفعالية
Open source	مفتوحة المصدر	Graphs and charts	الرسوم البيانية
Interpreted language	لغة مترجمة	Device specifications	مواصفات الجهاز
Game programming	برمجة الألعاب		

Notes

....

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Exercises on Lesson 6

1 Choose the correct answer:

1. Python is widely used in ....
   - a. data science
   - b. machine learning
   - c. web development
   - d. all of them
2. Python is .... programming language.
   - a. a free
   - b. an open source
   - c. both a and b
   - d. none of them
3. Python translates programming codes ....
   - a. all at once
   - b. line by line
   - c. in batches
   - d. none of them
4. Python is .... for beginners.
   - a. difficult
   - b. easy
   - c. complex
   - d. outdated
5. Python is known for its ....
   - a. versatility
   - b. complexity
   - c. limited use
   - d. high cost
6. Python can be integrated with ....
   - a. C
   - b. C++
   - c. Java
   - d. all of them
7. Python has libraries for ....
   - a. data analysis
   - b. graph creation
   - c. both a and b
   - d. none of them
8. NumPy library is used in ....
   - a. web development
   - b. data science
   - c. game programming
   - d. none of them
9. Pandas is a library for ....
   - a. creating graphs
   - b. data analysis
   - c. machine learning
   - d. none of them

10 Matplotlib library is used for ....

a. creating graphs
b. data analysis
c. web development
d. none of them

11 When downloading Python, you must choose ....

a. the operating system you are working on
b. the version number
c. the programming language
d. none of them

12 Python libraries provide ....

a. complex codes
b. limited functions
c. pre-built codes and functions
d. none of them

2 Put (✓) or (✗):

1 📖 Python is a free and open-source language, which does not allow anyone to develop it. ( )

2 📖 It is not permissible to create applications and websites in Python. ( )

3 📖 Python is used for data science and machine learning. ( )

4 📖 Python is an interpreted language because it translates programming codes line by line. ( )

5 📖 Python is used in developing web applications, data science, artificial intelligence, machine learning, and game programming. ( )

6 📖 Python is one of the most difficult programming languages. ( )

7 Python is a versatile language used in game programming. ( )

8 📖 Python can be integrated with other languages, such as C, C++, and Java. ( )

9 📖 One of the disadvantages of Python is the lack of libraries that you can use. ( )

10 📖 NumPy is a library used in data science, statistics, and artificial intelligence. ( )

11 Pandas is a library for analyzing and processing data. ( )

12 Matplotlib is a Python library used in artificial intelligence. ( )

3 Download Python from the official website and arrange the following steps in the correct order.

1 You must choose 64bit or 32bit, depending on your device specifications.

2 Visit the official Python website: www.python.org

3 Choose the system you are working on (Windows, Mac, or Linux).

4 After downloading, install the program on your device and follow the instructions.

5 Choose "Download".

3 Fill in the blanks:

1 Python is an .... language, meaning it translates codes line by line.

2 Python is .... source, meaning it allows everyone to use and develop.

3 Python can be integrated with other languages, such as ...., ..., and ....

4 Python is a .... language, meaning it is used for web development, AI, and game programming.

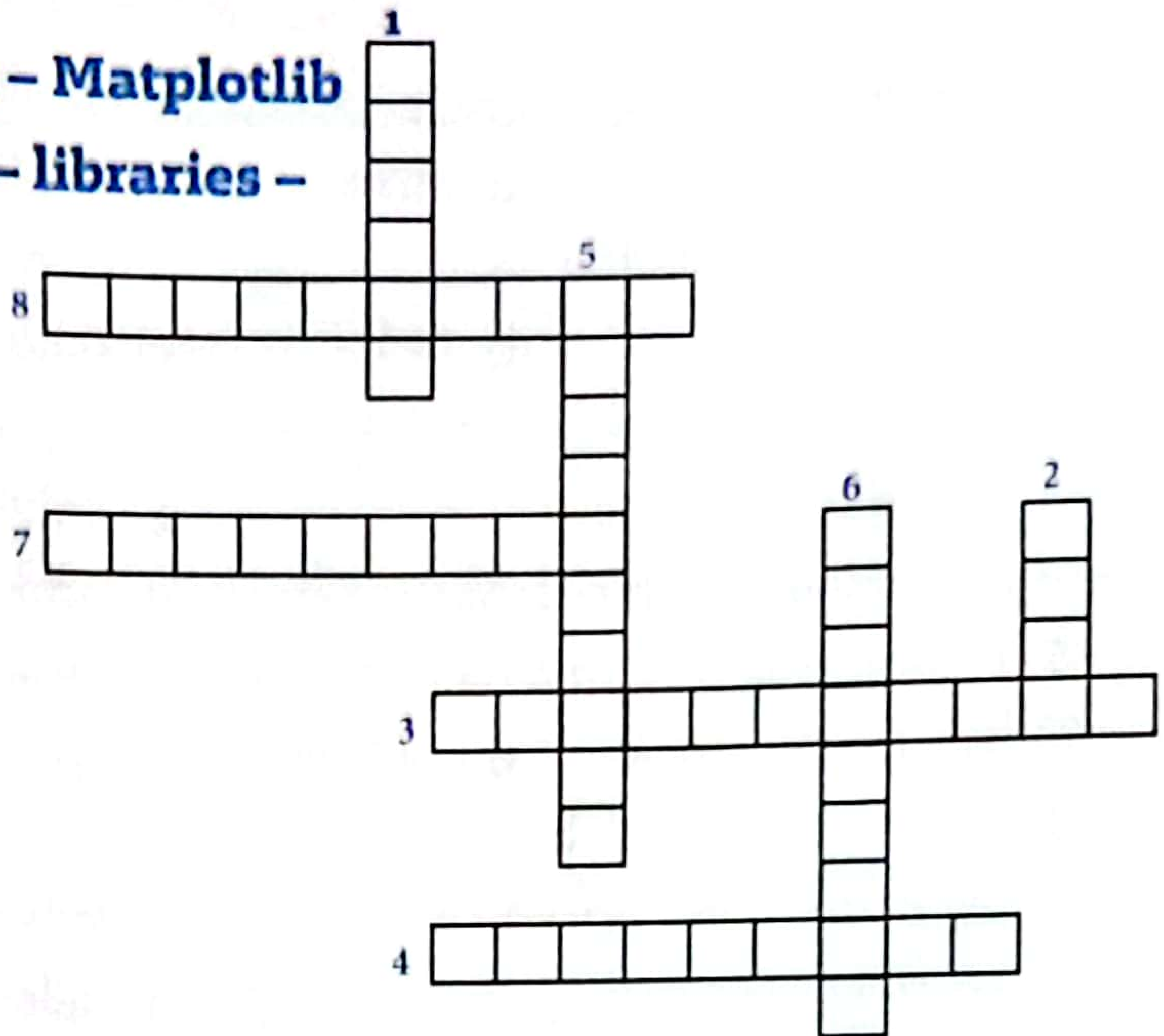
5 Python .... are pre-built codes and functions that help programmers perform specific tasks.

Play with PONY

Cross Word Game

(integrated – analyzing – Matplotlib – interpreted – Python – libraries – beginners – free)





1. .... is a programming language widely used in data science, machine learning, and for developing websites and applications.
2. Python is .... and open source, allowing everyone to use and develop it.
3. It is an .... language, which means that it translates programming codes line by line.
4. Python is one of the easiest programming languages for ....; it uses words similar to English.
5. Python can be .... with other languages, such as C, C++, and Java.
6. Python .... are pre-built codes that help programmers perform tasks without writing codes from scratch.
7. Pandas is a library for .... and processing data.
8. .... is a library for creating graphs and charts.

Test Yourself on Lessons 5&6

1 Choose the correct answer:

1. Python is a/an .... language that translates code line by line.
   a. compiled b. interpreted c. assembly d. binary
2. To draw a circle in Scratch, you can repeat drawing short lines at different ....
   a. colors b. sizes c. angles d. none of them
3. Python is available for .... operating system(s).
   a. Windows b. Mac c. Linux d. all of them
4. The "Choose Sprite" option is used to ....
   a. delete a sprite b. change the backdrop
   c. play a sound d. add a new sprite
5. Python is a programming language used in developing ....
   a. data science b. websites c. applications d. all of them
6. The "Go to x: y:" block is used to ....
   a. change the backdrop b. move the pen to a specific location
   c. play a sound d. delete a sprite
7. In Scratch, to start drawing with the pen, use the .... block.
   a. pen up b. pen down c. set pen color d. none of them

2 Put (✓) or (✗):

1. Python is an open source programming language. ( )
2. Sprites cannot be shown or hidden on the platform. ( )
3. Python libraries reduce the need to write codes from scratch. ( )
4. You cannot insert new backgrounds in Scratch. ( )
5. Python cannot be integrated with Java. ( )
6. The "Repeat" command is found in the Control group. ( )
7. NumPy is a Python library used for creating graphs and charts. ( )
8. The horizontal axis in Scratch is represented by X values. ( )

Lesson 7

Variables in Python

Variables

- In programming languages, a variable is a reserved space in memory used to store and save a specific value, where the value can change.

المتغيرات في لغات البرمجة:

- هي مكان محجوز في الذاكرة لتخزين وحفظ قيمة معينة؛ حيث يمكن للقيمة أن تتغير.

Examples:

Taher = 20

- Variable name: Taher
- Its value: 20
- You can change the value of the variable while dealing with the program immediately during the execution of the program.

- اسم المتغير: Taher
- قيمته: 20
- يمكنك تغيير قيمة المتغير أثناء التعامل مع البرنامج بشكل فوري أثناء تنفيذ البرنامج.

Conditions for Naming Variables in Python
شروط تسمية المتغيرات في لغة البايثون

Rules for Variable Names

- Start with
  - Letter (A – Z)
  - Underscore (_)
- Contain
  - Letters (A – Z)
  - Numbers (0–9)
  - Underscore (_)

شروط تسمية المتغيرات في لغة البايثون:

1. يبدأ اسم المتغير بحرف أو علامة الشرطة السفلية _ .
2. يحتوي اسم المتغير على حروف (A–Z) أو أرقام أو علامة الشرطة السفلية _

NOTES:

1 **Reserved words** may not be used in naming variables in Python because they express specific values that the program understands.
Example: (False) is a reserved word that indicates a logical value within python.

2 When writing a variable name, you must take into account placing the variable names in upper and lowercase letters.
For example: TAHER, Taher, taher, TaheR
In the previous example, the variable names refer to **4 variables** and not one variable.

1 لا يجوز استخدام الكلمات المحجوزة في تسمية المتغيرات في بايثون؛ لأنها تعبر عن قيم معينة يفهمها البرنامج، مثال: (False) هي كلمة محجوزة تشير إلى قيمة منطقية داخل بايثون.

2 عند كتابة اسم متغير يجب مراعاة كتابة أسماء المتغيرات بحروف كبيرة وصغيرة، مثلًا: TAHER, Taher, taher, TaheR: في المثال السابق أسماء المتغيرات تشير إلى 4 متغيرات وليس متغيرًا واحدًا.

Types of Variables in Python
أنواع المتغيرات في بايثون

1 Numbers | 2 Strings | 3 Booleans

1 Numbers:

- They are used to store **numerical values**, such as integers (int) and decimals (float).

Integer variables: X = 5 Y = 10
Decimal variables: Z = 5.25 A = 8.32

الأرقام: تستخدم لتخزين القيم العددية مثل: الأعداد الصحيحة (int) والأعداد العشرية (float).

2 Strings:

- They are used to store **texts**, such as names and addresses.
- Texts are placed between single quotes ' ' or double quotes " ".

Name = "Taher" **City** = 'Cairo'

النصوص: • تُستخدم لتخزين النصوص مثل: الأسماء والعناوين.
• يتم وضع النصوص بين علامات الاقتباس المفردة ' ' أو المزدوجة " ".

3 Booleans:

- They are a data type that contains only two values: True or False.
- They are often used in comparisons and decision making in codes.
  - Is_taher_student = False
  - Is_taher_a_teacher = True

القيم المنطقية:

• نوع بيانات يحتوي فقط على قيمتين True أو False.   • تُستخدم غالبًا في المقارنات واتخاذ القرارات في الأكواد.

NOTE 1: To know the type of the variable, you can use the **type ( )** function:

```
Python 3.10 (64-bit)
Python 3.10.4 (tags/v3.10.4:9d38120, Mar 23 2022, 23:13:41) [MSC v.1929 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information
>>> X = 5
>>> Y= 10
>>> Z = 5.25
>>> A = 8.32
>>> name = "Taher"
>>> city = 'Cairo'
>>> type (X)
<class 'int'>
>>> type (Y)
<class 'int'>
>>> type (Z)
<class 'float'>
>>> type (A)
<class 'float'>
>>> type (name)
<class 'str'>
>>> type (city)
<class 'str'>
>>>
```

NOTE 2:

- The **print ( )** function in Python is one of the most commonly used functions.
- It used to display text, variables, or the results of mathematical operations.

```
Python 3.10 (64-bit)
Python 3.10.4 (tags/v3.10.4:9d38120, Mar 23 2022, 23:13:41) [MSC v.1929 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> name = "Omar"
>>> address = 'Cairo, Egypt"
>>> age = 13
>>> print ("My name is", name)
My name is Omar
>>> print ("I live in", address)
I live in Cairo, Egypt
>>> print ("I am", age)
I am 13
>>>
```

Python Program Interface واجهة برنامج بايثون

❶ Interactive Python Interface (Python Shell):

- You can write simple codes and execute them directly to see the results.
- It is installed automatically when Python is installed; no need to download it.

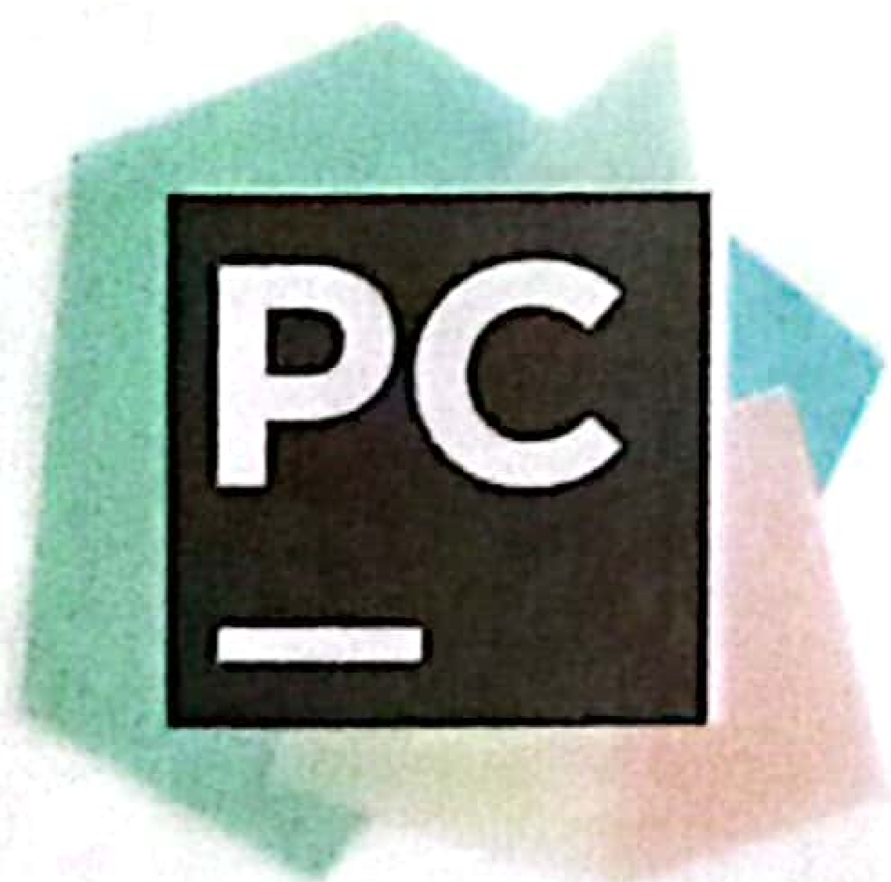
```
Python 3.10 (64-bit)
Python 3.10.4 (tags/v3.10.4:9d38120, Mar 23 2022, 23:13:41) [MSC v.1929 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello World")
Hello World
>>>
```

❶ واجهة بايثون التفاعلية (Python Shell):

- تستطيع كتابة أكواد بسيطة وتنفيذها مباشرة لرؤية النتائج.
- يتم تثبيتها تلقائيًا عند تثبيت بايثون، دون الحاجة إلى تنزيلها.

❷ Text Editor:

- It allows you to write longer and more complex codes.
- You can save codes to run them later.
- It must be downloaded from the Internet.
- **Examples:** Visual Studio, PyCharm





❷ مُحرِّر النصوص:

- يسمح لك بكتابة أكواد أطول وأكثر تعقيدًا.
- يجب تنزيلها من الإنترنت.
- يمكنك حفظ الأكواد لتشغيلها لاحقًا.
- مثال: Visual Studio - PyCharm.

اهم الكلمات والمصطلحات

Variables	المتغيرات	Decimal variables	متغيرات عشرية
Programming languages	لغات البرمجة	Strings	سلاسل نصية
Reserved place	مكان محجوز	Single quotes	علامات اقتباس فردية ' '
Interactive Python interface	واجهة بايثون التفاعلية	Double quotes	علامات اقتباس مزدوجة " "
Specific value	قيمة محددة	Booleans	القيم المنطقية
Execution of the program	تنفيذ البرنامج	Data type	نوع البيانات
Underscore	شرطة سفلية	Comparisons	مقارنات
Reserved words	كلمات محجوزة	Decision making	اتخاذ القرارات
Logical value	قيمة منطقية	Store and save	تخزين وحفظ
Uppercase and lowercase letters	أحرف كبيرة وصغيرة	Text editor	محرر النصوص
Numerical values	قيم رقمية	Output screen	شاشة الإخراج
Integer variables	متغيرات صحيحة	Mathematical operations	العمليات الرياضية



Exercises on Lesson 7

1 Choose the correct answer:

1 Variables in programming languages are used to ....

a. store values b. delete files c. create folders d. none of them

2 In Python, variable names can begin with ....

a. letters
b. underscore
c. numbers
d. both a and b

3 Which of the following is a valid variable name in Python?

a. 1Ahmed b. _Ahmed c. Ahmed-1 d. Ahmed@1

4 The variable names "Taher", "TAHER", and "taher" refer to .... variable(s).

a. the same b. different c. invalid d. reserved

5 📖 To know the type of the variable statement, we use the function ....

a. cos ( ) b. type ( ) c. print ( ) d. sin ( )

6 Decimal variables in Python are stored as .... data types.

a. string b. int c. float d. Boolean

7 Strings in Python are placed between ....

a. single quotes
b. double quotes
c. both a and b
d. none of them

8 Boolean variables in Python can have .... value(s).

a. one b. two c. three d. four

9 Python variables are ....

a. case-sensitive
b. case-insensitive
c. invalid
d. reserved

10 📖 To display texts, variables, or even the results of mathematical operations, we use the function ....

a. cos ( ) b. type ( ) c. print ( ) d. sin ( )

11 Text editors, like Visual Studio and PyCharm, ...

a. must be downloaded
b. are installed with Python
c. are ignored
d. none of them

12 The Python Shell is .... when Python is installed.

a. downloaded separately
b. installed automatically
c. ignored
d. none of them

2 Put (✓) or (✗):

1 Variables in programming languages are reserved places in memory to store and save a specific value. ( )

2 The value of a variable cannot be changed during the execution of a program. ( )

3 The variable name must not begin with a letter or an underscore sign (_). ( )

4 TAHER, Taher, taher, TaheR are 4 names for variables in the Python language. ( )

5 A variable name contains letters (A-Z), numbers, or an underscore sign (_). ( )

6 When naming variables, reserved words in the Python language may be used. ( )

7 The type ( ) function in Python is used to determine the type of a variable. ( )

8 In Y = 10, the statement type of variable Y is numeric for an integer. ( )

9 The value of a Boolean variable can be "Yes" or "No". ( )

10 In City = "Cairo", the statement type of the variable City is text. ( )

11 In Is_taher_student = False, the statement type of the variable Is_taher_student is logical. ( )

12 To know the type of the variable, we do not need to use the type ( ) function. ( )

13 The texts of variables are placed between single quotation marks ' ' or double quotation marks " ". ( )

14 PyCharm is an example of a text editor used for Python programming. ( )

3 Complete the following sentences:

1 .... in programming languages are used to store and save specific values.

2 In Python, variable names must begin with a .... or an underscore.

3 Strings in Python are placed between .... or double quotes.

4 The .... function in Python is used to display texts or values on the output screen.

5 The .... in Python is used to write and execute simple codes directly.

4 Match:

Variable Type	Example
1 String	a. X = 5
2 Boolean	b. A = 10.75
3 Integer	c. City = "Cairo"
4 Float	d. Is_taher_a_teacher = True
5 Reserved word	e. False

1 .... 2 .... 3 .... 4 .... 5 ....

5 Correct the errors in the following:

1 1st_variable = 100 ....

2 name = 'Ahmed ....

3 print ("Hello World" ....

4 city = 'Cairo" ....

5 age = "13" ....

Play with PONY

All About Me



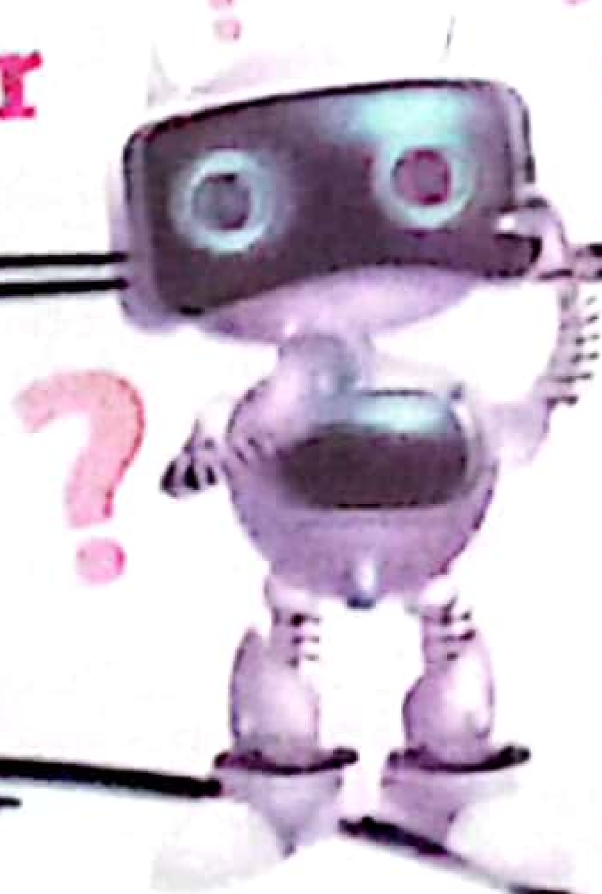


It express a reserved place in ....to store and save a specific value, where the value can change.

Numbers are used to store .... values, such as integers (int) and decimals (float).

Its name begins with a ....or an underscore (_).

numerical – Reserved Words – Strings – memory – variables – letter



.... are used to store texts, such as names and addresses.

.... are not used in naming them in Python.

Play with PONY



Answer the (true) or (false) questions:

1. When you finish all the questions in a column, cross out the matching color letter from 'PONY.'
2. After completing all columns, say 'PONY' and raise your hand.

P	O	N	Y
The size of the sprite is changed by its value in the Sprites Area. ( )	The variable name must not begin with a letter or an underscore sign (_). ( )	Python uses data science and machine learning. ( )	The Scratch program is paid. ( )
A type of sound sensor is used to avoid obstacles. ( )	The Start command is used to stop the project. ( )	Scratch uses a visual interface based on blocks. ( )	It is not permissible to create applications and websites in Python. ( )
Vision sensors are used in robots to capture sounds. ( )	Ultrasonic sensors are commonly used in remote controls. ( )	In Y= 10, the statement type of the variable Y is numeric for an integer. ( )	The motors used in robots include electric motors and air motors. ( )

Summary on Chapter 2

Lesson 1 Artificial Intelligence Applications

- **Narrow AI:** It focuses on specific tasks, such as face recognition or language translation.
- **General AI (GAI):** It can perform any human tasks, think, innovate, and adapt.
- **Super AI (SAI):** It is the most advanced; it can solve complex problems and discover new things.

Key Points:

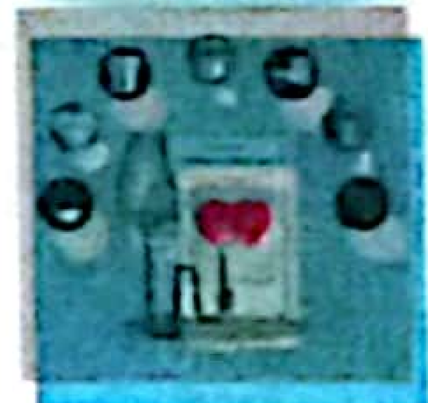
- **Applications of AI in Daily Life:**
  1. **Personal Assistant:** Like Siri or Alexa, They use AI to understand and perform commands.



  2. **Smart Games:** Video games use AI to make games fun and challenging.



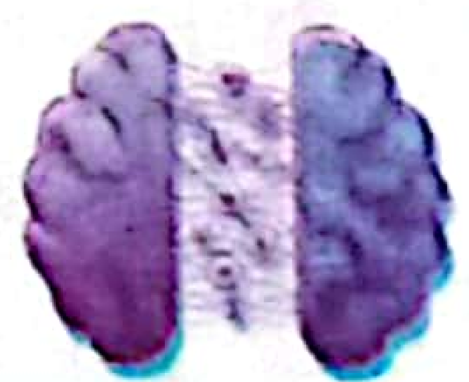
  3. **Smart Cars:** Self-driving cars are enabled by AI.
  4. **Digital Doctors:** AI aids in faster and more accurate medical diagnoses.



  5. **Instant Translator:** AI translates languages in real-time.
  6. **Smart Shopping:** AI suggests products based on previous purchases.



- **Fields of Artificial Intelligence:**
  1. **Machine Learning:** AI learns from data and experiences.
  2. **Natural Language Processing (NLP):** AI understands, interprets, and speaks human language.



  3. **Computer Vision:** AI analyzes and understands visual information.

4. Robotics: AI-powered robots perform various tasks.
5. Expert Systems: AI solves complex problems and make decisions.
6. Deep Learning: AI learns complex tasks using neural networks.

» Creating Intelligent Mo els with Teachable Machine:

- Teachable Machine: It is a tool for creating models to recognize images, sounds, and movements.
- Model Building Training: Teaching AI by showing it examples is similar to teaching a child.

Lesson 2 Sensors

Definition:

» Sensors: They are devices that sense changes in the environment and convert them into signals for machines to understand and make decisions.

Key Points:

» How Sensors Work:

1. Sensing: They capture information (heat, light, and sound).
2. Signal Conversion: They convert information into electrical signals.
3. Transmission: They send signals to display results or perform operations.

» Importance of Sensors for Robots:

- Function: Sensors act as the "senses" of robots, helping them see, hear, sense, and touch.

» Types of Robotic Sensor

1. Distance Sensors: They measure the distance to avoid collisions.
2. Light Sensors: They adapt to changing light conditions.
3. Sound Sensors: They respond to voice commands.
4. Motion Sensors: They detect movement and direction changes.

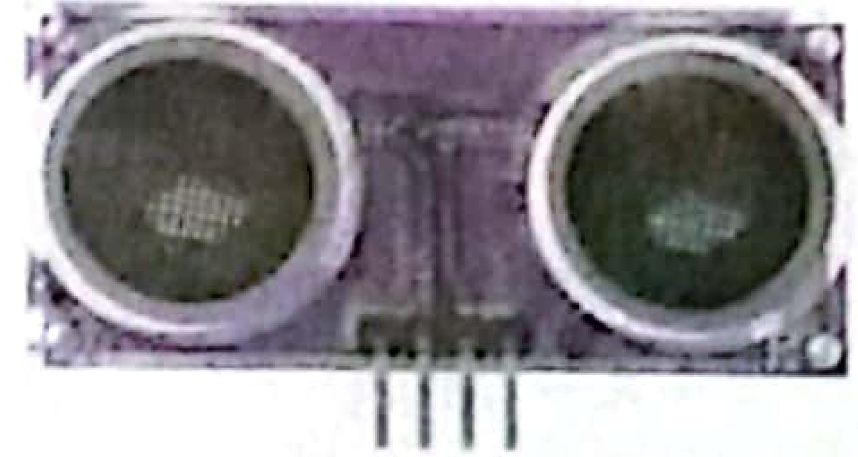
5. Special Sensors: They measure temperature and humidity.

Examples of Devices Using Sensors:

1. Vacuum Cleaner Robot: It avoids obstacles.
2. Surgical Robot: It uses precise sensors to perform surgeries.
3. Self-Driving Cars: They see the road and make decisions.

Types of Distance Sensors:

1. Ultrasonic Sensors: They emit high-frequency sound waves to measure distance.



- Examples: Vacuum cleaner robots, parking systems, and fluid level measurement

2. Laser Rangefinders: They emit laser beams for high accuracy.



- Examples: 3D laser scanners, ground scanning systems, and industrial measurement

3. Visible Light Sensors: They use digital cameras to analyze images.
- Examples. Self-driving car cameras, industrial vision systems, and augmented reality systems

4. Infrared Sensors: They emit infrared rays, then receive the returning rays.
   - They are widely used in consumer electronics.



- Examples: Remote controls, and non-contact thermometers

5. Time of Flight Sensors: They measure the light pulse travel time.
- Examples: 3D sensors, and motion tracking systems

Factors for Choosing Sensors:

1. Required Range: The maximum distance to measure
2. Required Accuracy: The measurement precision needed
3. Operating Environment: Conditions like lighting, temperature, and humidity.
4. Cost: Device and installation expenses.

Summary

- Daily Applications of Sensors:
  1. Smartphones: Taking pictures, adjusting lighting, determining locations
  2. Modern Cars: Measuring speed, warning of collisions, assisting in parking
  3. Smart Homes: Motion sensors for automatic lighting
  4. Phone Microphone: Converting sound to electrical signals
  5. Motion Sensors in Games: Detecting phone tilts
  6. Touch Screen: Sensing finger touches

Lesson 3 Robots

Definition:

- Robot: It is a device programmed to automatically perform specific tasks, capable of moving, sensing, and interacting with its surroundings.

Key Points:

- Types of Robots:
  1. Industrial Robots: They are used in factories for precise tasks, e.g., car production.



  2. Home Robots: They are found in homes, e.g., Roomba for cleaning floors.
  3. Medical Robots: They assist in surgeries with high accuracy.
  4. Educational Robots: They are used in schools to teach programming, e.g., LEGO Mindstorms.



- Robot Components:
  1. Structure: It is the main part carrying all components, made of materials like metal, plastic, or carbon.
  2. Sensors: They are the senses of the robot, e.g., sound sensors and cameras.
  3. Motors: They move parts of a robot, so it can move and execute commands, e.g., electric motors and pneumatic motors.

4. **Controller:** It is the "brain" of the robot, processes data and issues commands.
5. **Power Source:** It can be batteries, solar cells, or direct electrical power source.
6. **Software:** It makes the robot "smart," includes algorithms for responses.
7. **Communication Tools:** They interact with users or other robots, e.g., Bluetooth and Wi-Fi.

Areas of Use of Robots:



1. **Industry:** They improve productivity, reducing errors.
2. **Healthcare:** They assist in surgeries and patient care.
3. **Education:** They provide interactive learning.
4. **Agriculture:** They are used in precision farming to increase crops and reduce waste.

Challenges:

1. **Safety:** The need to ensure the safety of robots during work.
2. **Employment:** Concerns that they can replace human labor.
3. **Ethics:** Impact on society.

Benefits:

1. **Increased Efficiency and Productivity:** They can do continuous work without fatigue or interruption.
2. **High Accuracy and Reduced Errors:** They are precise in tasks, like surgeries and electronics assembly.
3. **Safety and Security:** They can perform dangerous tasks and handle heavy weights and hazardous materials.
4. **Adaptability and Diversity:** They perform various tasks efficiently. Ex: home robots and educational robots
5. **Reduced Costs:** They provide long-term cost savings by reducing human labor or errors, and achieving accuracy.
6. **Contributing to Development:** They encourage technological advancements, e.g., space exploration and medical research.

Project 3: Spaceship

- **Objective:** To move a spaceship randomly, make a sound, change size, repeat 5 times, start from (0, 0).
- **Steps:**
  1. **Insert Sprite:** Add Rocketship.
  2. **Remove:** Delete the cat sprite.
  3. **Background:** Choose "Space".

Square Drawing Project:

1. **Open Project:** Start a new project.
2. **Select Pen:** Drag the "pen" block to start drawing.
3. **Set Color and Size:** Use "Set Pen Color to" and "Set Pen Size to" blocks.
4. **Move the Pen:** Use "Go to x:y:" blocks to draw lines.
5. **Repeat the Steps:** Draw more lines to form shapes.

Drawing a circle:

- Use the "Repeat" block to repeat the process of drawing short lines at different angles.

Notes:

1. **Drawing Shapes:** Set start and end points for lines.
2. **Adding Details:** Add features like eyes, mouth, and ears.

Lesson 6 Principles of Python

Definition:

- **Python:** It is a programming language widely used in data science, machine learning, and web development.



Key Points:

Features of Python:

1. **Open Source:** It is free and open for everyone to use and develop.
2. **Interpreted Language:** It translates codes line by line, making error detection easier.
3. **Versatility:** It is used in web development, data science, AI, machine learning, and game programming.
4. **Easy-to-Use:** It is simple and organized, with syntax similar to English.
5. **Integration:** It can be integrated with languages like C, C++, and Java.
6. **Libraries:** Numerous libraries are available for various tasks.

Python Libraries:

- **NumPy:** It is used in data science, statistics, and AI.
- **Pandas:** It is used for data analysis and processing.
- **Matplotlib:** It is used for creating graphs and charts.

How to Download Python:

1. **Visit:** Go to the official Python website www.python.org.
2. **Choose Download:** Select the download option.
3. **Select System:** Choose your operating system (Windows, Mac, or Linux).
4. **Choose Bit Version:** Select 64-bit or 32-bit based on your device specifications.
5. **Install:** Download and install the program, following the instructions.

Lesson 7 Variables in Python

Definition:

- **Variables:** They are reserved places in memory to store values that can change during program execution.

Summary

Key Points:

Conditions for Naming Variables in Python:

1. Start with a letter or underscore (_).
2. Contain letters (A-Z), numbers, or underscore (_).
3. Avoid reserved words.

Types of Variables in Python:

1. **Numbers:** To store numerical values.
   - **Integer Variables (int):** X = 5, Y = 10
   - **Decimal Variables (float):** Z = 5.25, A = 8.32
2. **Strings:** To store texts, enclosed in single or double quotes.
   - **Examples:** Name = "Taher", City = 'Cairo'
3. **Booleans:** They contain only two values, True or False.
   - **Examples:** Is_taher_student = False, Is_taher_a_teacher = True

Python Program Interface:

1. **Interactive Python Interface (Python Shell):** It is used to write and execute simple codes directly.
   - It is automatically installed when you install the language.
2. **Text Editor:** It is used to write longer, complex codes and save them for later execution.





Using the type ( ) Function:

- **Purpose:** To determine the type of a variable.

Simple Python Code Using Variables:

- **Print Function:** It displays text, variables, or results of mathematical operations on the output screen.

Final Exams



Model Exam 1

1 Choose the correct answer:

1. The function .... is used to display texts or values on the output screen
   a. cos ( ) b. type ( ) c. print ( ) d. sin ( )
2. The area that contains the objects used in the project of the Scratch program is the ....
   a. Script Area b. Stage Area c. Sprites Area d. Blocks Area
3. Narrow AI focuses on ....
   a. multiple tasks b. specific tasks
   c. human-like tasks d. all tasks
4. .... help cars determine the distance to other vehicles.
   a. Sound sensors b. Light sensors
   c. Infrared sensors d. Special sensors
5. .... is the practical use of motion sensors in games.
   a. Changing the volume
   b. Adjusting the brightness of the screen
   c. Tracking the movements of a player
   d. Improving the sound quality

2 Put (✓) or (✗):

1. The texts of variables are placed between single quotation marks ' ' or double quotation marks " ". ( )
2. Instant translator is used to facilitate communication between people. ( )
3. Sensors play a role in the movement of robots and sensing their surrounding environment. ( )
4. Only one sprite can be added to the platform. ( )
5. Python is a free and open-source language that does not allow anyone to develop it. ( )

3 Complete the following sentences:

1. To repeat a set of commands 10 times in the Scratch program, use the .... block from the Control group.
2. Python .... are pre-built codes and functions that help programmers perform specific tasks.
3. Robots use communication tools, such as .... , to interact with users or other robots.
4. To execute a Scratch project, click on the .... icon.
5. .... are used in robots to move their parts, such as robotic arms or wheels.

Model Exam 2

1 Choose the correct answer:

1. The text value of the variable is placed between the signs ....
   a. " " b. <> c. ' ' d. both a and c
2. The Scratch program features include ....
   a. that it's a free program b. developing creative thinking
   c. enhancing problem solving skills
   d. both b and c
3. .... are used to avoid obstacles.
   a. Light sensors b. Sound sensors
   c. Distance sensors d. Heat sensors
4. .... is an AI application that can diagnose and treat diseases.
   a. Personal Assistant b. Digital Doctor
   c. Smart Car d. Expert System
5. .... is the main purpose of the signal conversion step in sensors.
   a. Displaying the results
   b. Sending the signals to another device
   c. Converting the information into electrical signals
   d. Turning off the sensor

2 Put (✓) or (✗):

1 To know the type of the variable, we use the print ( ) function. ( )

2 It is not permissible to create applications and websites in Python. ( )

3 The sprite can be deleted from the platform. ( )

4 Robots' work is limited to factories only. ( )

5 Smart games are used to make playing games more fun. ( )

3 Arrange the following robot components in the order they interact when a robot is performing a task:

1 ( ) The sensors detect information.

2 ( ) The controller processes the data.

3 ( ) The motors execute commands.

4 ( ) The power source provides energy.

Model Exam 3

1 Choose the correct answer:

1 The benefits of using robots in industry include ....

a. decreasing human errors
b. improving productivity
c. reducing accuracy
d. both a and b

2 Robots help in dangerous tasks, such as ....

a. transportation
b. handling heavy weights and hazardous chemicals
c. irrigating gardens and parks
d. cleaning the house

3 Machine learning means ....

a. understanding Languages
b. seeing the world
c. learning from mistakes
d. deep learning

4. Scratch uses a visual interface based on ....
   a. menus
   b. texts
   c. icons
   d. blocks

5. .... are used for non-contact temperature measurement.
   a. Ultrasonic sensors
   b. Infrared sensors
   c. Light sensors
   d. Motion sensors

2 Put (✓) or (✗):

1. In Is_taher_student = False, the statement type of the variable Is_taher_student is logical. (   )
2. Python uses data science and machine learning. (   )
3. Medical robots help doctors perform surgeries. (   )
4. AI can look at a picture and tell you everything in it, which is called Computer Vision. (   )
5. Robots are very good at doing a lot of things with great accuracy. (   )

3 Correct the underlined words:

1. <u>Sound sensors</u> help robots avoid collisions by measuring the distance to obstacles. (..............................)
2. <u>Narrow AI</u> is a type of AI that can perform any task a human can do. (..............................)
3. The <u>Pen up</u> block is used to draw a line in Python. (..............................)
4. <u>Scratch</u> is a versatile language, meaning it is used for web development, AI, and game programming. (..............................)
5. The <u>type ( )</u> function in Python is used to display text or values on the output screen. (..............................)

Model Exam 4

1 Choose the correct answer:

1 The challenges facing robotics technology include ....
  a. an increased reliance on paper documents
  b. an increased reliance on smartphones
  c. safety, employment, and ethics
  d. an increased reliance on traditional machines

2 To know the type of the variable statement, we use the function ....
  a. cos ( ) b. type ( ) c. print ( ) d. sin ( )

3 .... is an artificial intelligence field.
  a. Computer Vision b. Deep Energy
  c. Siri d. None of them

4 .... sensors are used to turn on lights when someone enters the room.
  a. Smartphone b. Smart car
  c. Smart home lighting system d. Smart watch

5 The Python Shell is .... when Python is installed.
  a. downloaded separately b. installed automatically
  c. ignored d. none of them

2 Put (✓) or (✗):

1 In City = "Cairo", the statement type of the variable City is text. (   )

2 To implement the project, click on the symbol . (   )

3 The design of the structure affects the weight of the robot and its ability to move. (   )

4 Distance sensors are used in measuring the distance between the robot and surrounding obstacles. (   )

5 The Stop command is used to watch the project execution. (   )

3 Correct the errors related to naming variables in the following:

1 print (Hello World)

....

2 True= "Ahmed"

....

3 IsStudent = "False"

....

4 price= '100'

....

5 name = Ahmed
type ("name")

....

Model Exam 5

1 Choose the correct answer:

1 To take pictures and videos, we use .... sensors.
a. sound b. touch c. light d. vision

2 .... is an application of AI that can translate words and sentences instantly, making it easier for people to communicate.
a. Smart Shopping
b. Instant Translator
c. Machine Learning
d. Personal Assistant

3 One of the sensors that are used to measure distance using high-frequency sound waves is ....
a. ultrasonic sensors b. laser rangefinders
c. infrared sensors d. motion sensors

4 In production lines, robots can perform repetitive tasks accurately and without any delay, which leads to ....
   a. an increased efficiency and productivity
   b. a decreased efficiency and productivity
   c. a lack of product development
   d. a slow production process

5 The sprite in Scratch represents the ....
   a. background
   b. object or character
   c. command block
   d. File menu

2 Put (✓) or (✗):

1 Variables in programming languages are reserved places in memory to store and save a specific value. (   )

2 You can add many sprites to your Scratch project. (   )

3 In the Scratch program, the result of the work or project appears in the Blocks Area. (   )

4 Pandas is a library used in data science, statistics, and artificial intelligence. (   )

5 Vision sensors are used to capture sounds. (   )

3 Arrange the following steps in the correct order:

1 (   ) You must choose 64bit or 32bit, depending on your device specifications.

2 (   ) Visit the official Python website: www.python.org

3 (   ) Choose the system you are working on (Windows, Mac, or Linux).

4 (   ) After downloading, install the program on your device and follow the instructions.

5 (   ) Choose "Downloads".

Model Exam 6

1 Choose the correct answer:

1 The structure of a robot can be made of materials, such as ....
a. metals b. plastic c. carbon d. all of them

2 .... is a type of artificial intelligence that can solve problems that are difficult for humans to solve easily.
a. Narrow AI b. GAI c. SAI d. Local AI

3 The factors that determine the choice of a sensor for a particular application include the ....
a. brand of the device b. color of the device
c. environment and required accuracy
d. size of the device

4 In which environment are light sensors useful?
a. In dark rooms
b. In places with variable lighting conditions
c. In underwater environments d. In noisy factories

5 The main function of a sensor is to ....
a. store data
b. capture environmental changes and convert them into signals
c. display images d. produce sounds

2 Put (✓) or (✗):

1 The variable name must not begin with a letter or an underscore sign (_). ( )
2 In the Scratch program, the Stage Area shows the programming sections. ( )
3 Matplotlib is a Python library used in analyzing data. ( )
4 Artificial intelligence is only used in the video game industry. ( )
5 Python is used in developing web applications, data science, artificial intelligence, machine learning, and game programming. ( )

3 Complete the following sentences:

1 The .... is the "brain" of the robot, processing data from sensors.

2 Laser rangefinders are characterized by their high .... and longer range.

3 .... enables AI to understand and respond to human languages.

4 .... includes algorithms that make a robot smart.

5 The sprites area in Scratch contains the .... used in the project.

Model Exam 7

1 Choose the correct answer:

1 In Scratch, you can save the project from the .... menu.
a. Edit b. Home c. File d. none of them

2 To take pictures and videos, we use .... sensors.
a. sound b. touch c. light d. vision

3 The first step in the operation of a sensor is ....
a. transmitting b. displaying c. sensing d. transduction

4 A common application of sensors is the use of infrared in ....
a. smartphones b. remote controls
c. vacuum cleaners d. 3D scanning

5 Sensors help robots to ....
a. teach them new languages
b. allow them to interact with their environment
c. increase their size
d. slow down their operations

2 Put (✓) or (✗):

1 TAHER, Taher, taher, TaheR are 4 names for variables in the Python language. ( )

2 Python is one of the most difficult programming languages. ( )

3 Artificial intelligence is only one type. ( )

4 The horizontal and vertical axes are used to know the current location of the sprite on the platform. ( )

5 In the Scratch program, students face difficulty in sharing projects with others. ( )

3 Complete the following sentences:

1 In Python, variable names must begin with a .... or an underscore.

2 Python is an .... language, meaning it translates code line by line.

3 Ultrasonic sensors use high frequency .... waves to measure the distance to an object.

4 Deep learning depends mainly on ....

5 .... is the most advanced type of AI.

Model Exam 8

1 Choose the correct answer:

1 In Scratch, Y=0 represents the .... axis.

a. horizontal b. vertical c. diagonal d. none of them

2 Laser rangefinders are accurate because they use ....

a. sound waves b. visible lights

c. high-frequency waves d. laser beams

3 .... are used to avoid obstacles.

a. Light sensors b. Sound sensors

c. Distance sensors d. Heat sensors

4 Robots use .... to interact with users or other robots.

a. sensors b. communication tools

c. motors d. power sources

5 In Scratch, X=0 represents the .... axis.

a. horizontal b. vertical c. diagonal d. none of them

2 Put (✓) or (✗):

1 Python can be integrated with other languages, such as C, C++, and Java. ( )

2 The Scratch program helps the student learn the principles of programming. ( )

3 Robots rely on direct energy sources only and we cannot use batteries or solar cells. ( )

4 The variable name can contain letters (A-Z), numbers, or an underscore sign (_). ( )

5 The location of the sprite on the platform is determined by the value of the horizontal axis X only. ( )

3 Complete the following sentences:

1 Variable names in python can contain ...., ... and ....

2 Python is .... source, meaning it allows everyone to use and develop it.

3 To add a new sprite in Scratch, click on the .... button in the Sprites Area.

4 The file extension for Scratch projects is ....

5 Robots use .... to move their parts, such as robotic arms.

Model Exam 9

1 Choose the correct answer:

1 In Scratch, to set the line thickness, use the .... block.
a. Set Pen Size to
b. Set Pen Color to
c. Change Pen Size by
d. none of them

2 .... are commonly used in remote controls.
a. Ultrasonic sensors
b. Infrared sensors
c. Light sensors
d. Motion sensors

3 To make the movement continuous, you can install the "Move" command .... time(s).
a. one
b. several
c. zero
d. none of them

4 The background "Space" in Scratch is chosen by clicking on ....
a. Choose a Backdrop
b. Choose a Sprite
c. Choose a Sound
d. Choose a Motion

5 Python libraries provide ....
a. complex codes
b. limited functions
c. pre-built codes and functions
d. none of them

2 Put (✓) or (✗):

1 One of the disadvantages of Python is the lack of libraries that you can use. (   )

2 The sprite name can be modified only once. (   )

3 The motors used in robots include electric motors and air motors. (   )

4 Artificial intelligence is a science of computer science. (   )

5 When naming variables, reserved words in the Python language may be used. (   )

3 Complete the following sentences:

1 The .... is the main part of the robot that carries all its components and can be made of materials like metals or plastic.

2 Visible light sensors use .... to analyze images.

3 .... is a tool that helps create AI models to recognize images, sounds, and movements.

4 To create movement in Scratch, you use commands from the .... group.

5 To change the direction of a sprite, modify the .... value.

Model Exam 10

1 Choose the correct answer:

1 The challenges facing robotics technology include ....

a. an increased reliance on paper documents
b. an increased reliance on smartphones
c. safety, employment, and ethics
d. an increased reliance on traditional machines

2 The first step in the operation of a sensor is ....

a. transmitting b. displaying
c. sensing d. transduction

3 Python can be integrated with ....

a. C b. C++
c. Java d. all of them

4 The "Go to random position" command is found in the .... group.

a. Motion b. Sound c. Control d. Events

5 The "Wait" command is found in the .... blocks.

a. Motion b. Looks c. Events d. Control

2 Put (✓) or (✗):

1 In Y= 10, the statement type of the variable Y is numeric for an integer. ( )

2 NumPy is a library used in data science, statistics, and artificial intelligence. ( )

3 The sprites used in the project appear in the Sprites area. ( )

4 Visual Studio is an example of a text editor used for Python programming. ( )

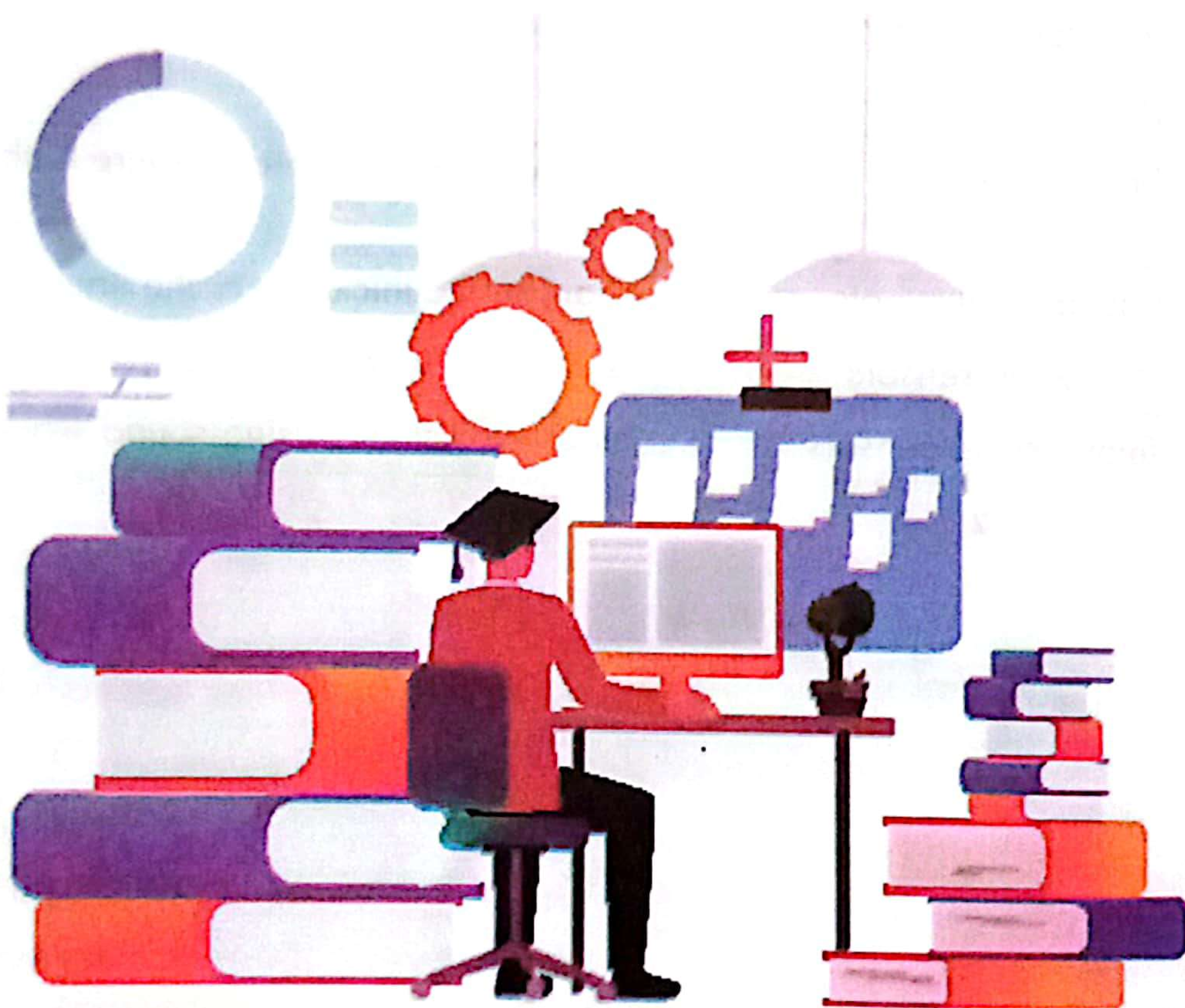
5 To add a new sprite, click on Choose Sprite. ( )

3 Match:

Column (A)	Column (B)
1 In Scratch, "Set Pen Size to"	a. are used in classrooms.
2 Boolean is:	b. measure the body temperature without contact.
3 Educational robots	c. changes the thickness of the line.
4 Ultrasonic sensors	d. Is_taher_a_teacher = True
5 Temperature sensors	e. measure distance using sound waves.

1 .... 2 .... 3 .... 4 .... 5 ....

Model Answers



Chapter 2

Lesson 1

1
1 b 2 a 3 b 4 d 5 b
6 d 7 b 8 a 9 b 10 c
11 a 12 d 13 d 14 d 15 b
16 b 17 c 18 c

2
1 ✓ 2 ✗ 3 ✓ 4 ✓ 5 ✗
6 ✓ 7 ✗ 8 ✗ 9 ✓ 10 ✗
11 ✓ 12 ✗ 13 ✓ 14 ✓ 15 ✓
16 ✗ 17 ✓ 18 ✓ 19 ✓

3
1 SAI 2 neural networks
3 Natural Language Processing
4 Teachable Machine 5 GAI

4
3, 5, 1, 4, 2

Play with Pony

1 e 2 c 3 d 4 b 5 f
6 a

Lesson 2

1
1 b 2 b 3 c 4 c 5 b
6 b 7 d 8 d 9 b 10 c
11 a 12 c 13 b 14 c 15 d
16 c 17 c

2
1 ✓ 2 ✗ 3 ✓ 4 ✗ 5 ✓
6 ✓ 7 ✗ 8 ✓ 9 ✗ 10 ✓
11 ✓ 12 ✗ 13 ✓ 14 ✗ 15 ✗
16 ✗ 17 ✓ 18 ✓

3
1 e 2 c 3 b 4 a 5 d

4
B → C → A

5
1 sensing, signal conversion, transmission
2 sound 3 accuracy
4 digital cameras 5 collisions

Play with Pony

1 Vacuum cleaner robots - Parking systems - Fluid levels
2 3D laser scanners - Ground scanning systems - industrial measurement systems
3 Self-driving car cameras - Industrial vision systems - Augmented reality systems
4 Non-contact thermometers - Remote controls
5 Motion tracking systems - 3D sensors

Test Yourself on Lessons 1&2

1
1 c 2 a 3 c 4 c 5 b
6 c 7 c

2
1 ✗ 2 ✓ 3 ✓ 4 ✗ 5 ✗
6 ✗ 7 ✗ 8 ✓

Lesson 3

1
1 c 2 a 3 b 4 d 5 b
6 a 7 c 8 c 9 d 10 c
11 a 12 b 13 b 14 c
15 b 16 d 17 b

2
1 ✓ 2 ✗ 3 ✓ 4 ✗ 5 ✓
6 ✓ 7 ✓ 8 ✓ 9 ✗ 10 ✓
11 ✓ 12 ✗ 13 ✗ 14 ✓ 15 ✓
16 ✓

3
1 b 2 a 3 c 4 d

4
1 controller 2 motors
3 sensors 4 structure
5 Motors

5 (4) The power source supplies energy.
(1) The sensors detect information.
(2) The controller processes data.
(3) Motors execute commands.

Play with Pony

f	e	i	a	d	e	e	v	g	b	t	b	r	a	i	n	p	a
s	y	r	f	c	a	p	d	l	q	l	y	u	v	a	a	h	u
h	e	m	u	a	t	l	k	u	b	d	u	w	j	b	s	p	f
x	s	n	e	n	h	u	g	d	c	v	f	e	v	s	p	d	v
f	z	o	s	d	d	a	a	o	k	a	e	m	t	r	w	v	h
e	r	v	r	o	j	k	j	t	r	h	t	v	q	o	q	r	f
u	j	d	s	t	r	c	b	g	o	i	e	i	t	k	o	z	m
j	i	l	f	p	v	s	a	a	j	r	t	c	o	f	z	t	c
v	m	i	s	f	e	a	w	l	w	m	s	h	p	n	l	b	h
p	o	w	e	r	s	o	u	r	c	e	a	l	m	a	a	c	f
m	a	u	t	o	m	a	t	i	c	a	l	l	y	s	a	l	g
m	k	k	k	s	t	r	u	c	t	u	r	e	k	t	m	o	g

Lesson 4

1
1 b 2 c 3 d 4 a 5 b
6 b 7 d 8 d 9 d 10 b
11 b 12 a 13 d 14 b 15 a
16 a 17 c

2
1 ✓ 2 ✗ 3 ✓ 4 ✗ 5 ✓
6 ✗ 7 ✓ 8 ✗ 9 ✗ 10 ✓
11 ✗ 12 ✗ 13 ✗ 14 ✓ 15 ✗

3
1 sb3 2 Menu bar
3 Sprites Area 4 Motion
5 green flag

4
1 Script Area
2 Command Blocks Area
3 Stage Area
4 Sprite
5 Sprites Area

5 3, 1, 2, 4

Play with Pony

– Play on your own.

Test Yourself on Lessons 3&4

1
1 a 2 c 3 d 4 d 5 b
6 d 7 c

2
1 ✓ 2 ✓ 3 ✗ 4 ✓ 5 ✗
6 ✗ 7 ✓ 8 ✗

Lesson 5

1
1 b 2 c 3 a 4 a 5 b
6 a 7 c 8 b 9 d 10 b
11 b 12 a 13 a

2
1 ✓ 2 ✗ 3 ✗ 4 ✓ 5 ✓
6 ✓ 7 ✗ 8 ✓ 9 ✓ 10 ✗
11 ✓ 12 ✗ 13 ✓ 14 ✗ 15 ✗
16 ✓

3
1 sprites 2 Choose Sprite
3 Pen down 4 direction
5 Repeat

4
1 d 2 e 3 c 4 a 5 b

5 b → a → c → d

Play with Pony

– Play on your own.

Lesson 6

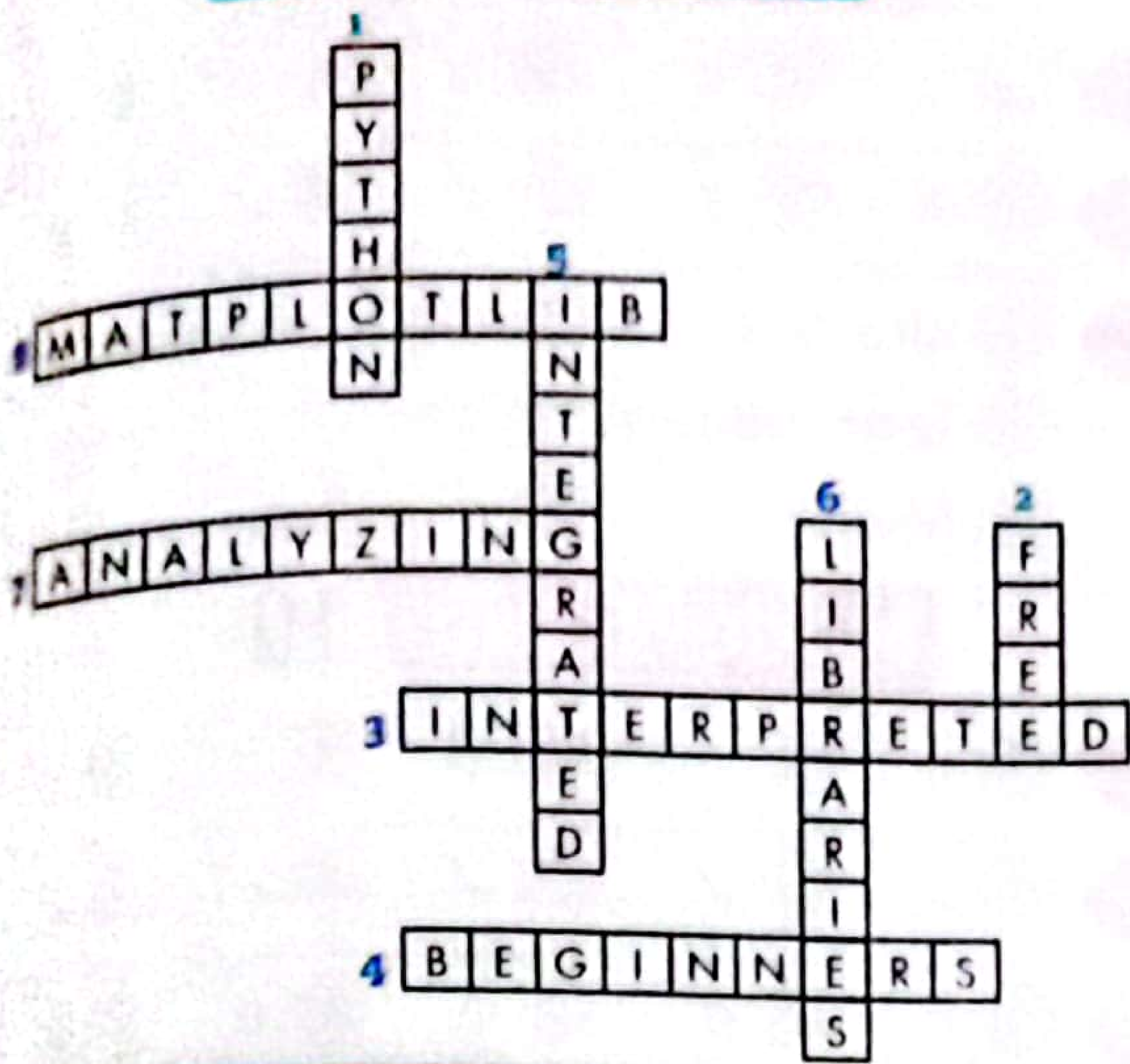
1
1 d 2 c 3 b 4 b 5 a
6 d 7 c 8 b 9 b 10 a
11 a 12 c

2
1 ✗ 2 ✗ 3 ✓ 4 ✓ 5 ✓
6 ✗ 7 ✓ 8 ✓ 9 ✗ 10 ✓
11 ✓ 12 ✗

3 2 → 5 → 3 → 1 → 4

4
1 interpreted 2 open
3 C, C++, java 4 versatile
5 libraries

Play with Pony



Test Yourself on Lessons 5&6

1 1 b 2 c 3 d 4 d 5 d 6 b 7 b

2 1 ✓ 2 ✗ 3 ✓ 4 ✗ 5 ✗ 6 ✓ 7 ✗ 8 ✓

Lesson 7

1 1 a 2 d 3 b 4 b 5 b 6 c 7 c 8 b 9 a 10 c 11 a 12 b

2 1 ✓ 2 ✗ 3 ✗ 4 ✓ 5 ✓ 6 ✗ 7 ✓ 8 ✓ 9 ✗ 10 ✓ 11 ✓ 12 ✗ 13 ✓ 14 ✓

3
1 Variables
2 letter
3 single quotes
4 print ( )
5 Python Shell

4 1 c 2 d 3 a 4 b 5 e

5
1 First_variable = 100
2 name = 'Ahmed'
3 print ("Hello World")
4 city = 'Cairo' or city = "Cairo"
5 age =13

Play with Pony

– Play on your own.

Play with Pony

– Play with your colleagues.

Final Exams

Model Exam 1

1 1 c 2 c 3 b 4 b 5 c

2 1 ✓ 2 ✓ 3 ✓ 4 ✗ 5 ✗

3
1 Repeat
2 libraries
3 Bluetooth – Wi-Fi
4 green flag
5 Motors

Model Exam 2

1 1 d 2 d 3 c 4 b 5 c

2 1 ✗ 2 ✗ 3 ✓ 4 ✗ 5 ✓

3 4 → 1 → 2 → 3

Model Exam 3

1 1 d 2 b 3 c 4 d 5 b

2 1 ✓ 2 ✓ 3 ✓ 4 ✓ 5 ✓

3
1 Distance sensors
2 GAI
3 Pen down
4 Python
5 print ( )

Model Exam 4

1 1 c 2 b 3 a 4 c 5 b

2 1 ✓ 2 ✓ 3 ✓ 4 ✓ 5 ✗

3
1 print ("Hello World") – The text should be placed between " ".
2 name = "Ahmed" – Reserved words are not used as variable names.

3 is_student= false – Boolean values are not placed between " ".

4 price= 100 – Numeric values are not placed between " ".

5 type (name) – Input of type ( ) should be a variable name without " ".

Model Exam 5

1
1 d 2 b 3 a 4 a 5 b

2
1 ✓ 2 ✓ 3 ✗ 4 ✗ 5 ✗

3
2 → 5 → 3 → 1 → 4

Model Exam 6

1
1 d 2 c 3 c 4 b 5 b

2
1 ✗ 2 ✗ 3 ✗ 4 ✗ 5 ✓

3
1 controller 2 accuracy
3 Natural Language Processing
4 Software 5 sprites

Model Exam 7

1
1 c 2 d 3 c 4 b 5 b

2
1 ✓ 2 ✗ 3 ✗ 4 ✓ 5 ✗

3
1 letter 2 interpreted
3 sound 4 neural networks
5 SAI

Model Exam 8

1
1 b 2 d 3 c 4 b 5 a

2
1 ✓ 2 ✓ 3 ✗ 4 ✓ 5 ✗

3
1 letters – numbers – underscores
2 open 3 Choose Sprite
4 sb3 5 motors

Model Exam 9

1
1 a 2 b 3 b 4 a 5 c

2
1 ✗ 2 ✗ 3 ✓ 4 ✓ 5 ✗

3
1 structure 2 digital cameras
3 Teachable Machine
4 Motion 5 direction

Model Exam 10

1
1 c 2 c 3 d 4 a 5 d

2
1 ✓ 2 ✓ 3 ✓ 4 ✓ 5 ✓

3
1 c 2 d 3 a 4 e 5 b